


THE
PRACTICAL
GAUGER:

BEING

A Plain and Easie Method
O F
GAUGING

ALL SORTS OF

Brewing-Vessels.

Whereunto  Added

A Short SYNOPSIS of
the LAWS of EXCISE,
now in Force.

By JOHN MAYNE.

*The Fifth Edition, Corrected and Enlarged
with the Addition of the Duty upon Malt.*

London: Printed for J. Phillips, at the
King's-Arms in St. Paul's-Church-yard,
H. Rhodes, at the Star, the Corner of
Bride-Lane in Fleet-street, and J. Taylor
at the Ship in St. Paul's-Church-yard,
1699.

156

THE
PRACTICAL
GALLER
BEING
A Plain and Easy Method
OF
GALLING

Brewing-Vessels

Wholesale and Retail

A Short & EASY
MANNER OF
THE ART OF
NOW IN FORCE

By JOHN WATTS

The Fifth Edition, corrected and enlarged
with the Addition of new Instructions

London: Printed for J. WATTS, at the
New-Method, in the Strand, near
St. Dunstons Church, in the Year
1750. Price 1s. 6d. per Copy.
and sold by all the Booksellers in
Great-Britain.

To the Honourable

PEREGRINE BERTIE, *Esq;*

May it please Your Honour,

MY present Service is
so much the more
valuable to me,
since I was preferred there-
to by Your Recommenda-
tion, which I shall endea-
vour to preserve with un-
wearied Industry and con-
stant Fidelity. Your Fa-
vour, Sir, is a Blessing my
A 2 Soul

The Dedication.

Soul is too narrow to en-
close, and methinks I can
hardly be reconciled to
that Divinity which calls
Pride a Sin. But if I am
guilty, I heartily beg your
Pardon, and Permission to
subscribe,

Your Honour's

Most humbly devoted

Servant,

John Mayne.

To the Reader.

READER.

HAVING been command-
ed, by my Masters in
the North-west
Parts of this Kingdom, I found
there many ingenious Men,
employ'd in their Service, viz.
the Revenue of EXCISE,
who were willing to gain
some little Knowledge in the
Art of Gauging; but had
been frighted therefrom by
the

To the Reader.

the seeming difficulty of obtaining their desires. I thought it no disservice to endeavour to inform these Men, upon whose Shoulder the whole matter of Fact, in this Affair, between the King and the Subject lay. And accordingly I wrote to some of them, these short Rules thou hast now before thee; endeavouring to make the Art plain and easie, even to the meanest Capacity; without much expence of Time in reading the Text, or overcharging their Memories with

To the Reader.

*with hard Terms of Art;
And not having leisure to
write so many Copies, as my
Friends in those Parts desi-
red, I am prevailed with to
commit it to the Press. Fare-
well.*

J. M.

THE

THE
I would be-buy to ourment that
I have now with acquaintance with
Original doth not for

To the Reader.

With hard Terms of
and not having leisure
to write so many Copies, as
friends in those Parts de-
sire, I am prevailled with to
commit it to the Press. For

T H E

Practical GAUGER.

IT would be very convenient, that every *Gauger* were well acquainted with the Art of *Decimal Arithmetick*; but it is necessary, that he be so well seen in *Valgar*, as to be able to add, subtract, multiply and divide any whole Numbers. Those that are not yet perfect in *Valgar* and *Decimal Arithmetick*, I refer them to Sir *Jonas Moor's Arithmetick*, to be had at this *Book-seller's*, (or most others;) wherein they will find such plain and intelligible Directions, that a mean Capacity may make himself Master thereof without a Tutor.

It is also necessary, that he understand the three sorts of Quantity,

2 *The Practical Gauger.*

viz. a Line, a Superficies, and a Solid.

A Line has length, but no breadth.

A Superficies has length and breadth, but no depth.

A Solid has length, breadth and depth.

Moreover, there is no kind of Quantity, but is commensurable by some common Measure thereto assign'd; as a Line, by a Line of Inches, Feet, Poles, Furlongs, &c. and a Superficies by a Superficies, as the square Inch, &c. and also a Solid by a Solid: So when it is known how many Inches, Poles, or Furlongs are contain'd in any Line, the length of that Line, is said to be known: And when it is known how many square Inches, square Feet, or square Perches are contain'd within any Superficies, the Content, or *Area* of that Superficies, is said to be known: And also when it is known how many solid Inches are contain'd in any Solid;

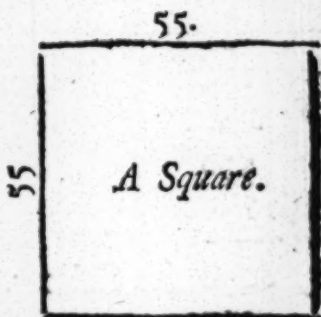
The Practical Gauger. 3

Solid, the Content of that Solid is known.

To find the Content of a Back, in the form of a Square, or Parallelogram.

The Rule is,

Multiply the length by the breadth, and the Product divide by 282, (the number of solid Inches contained in the Ale-Gallon, and the Quotient is the Ale-Gallons contained upon one Inch in depth of that Back or Tun.



$$\begin{array}{r} B \quad 255 \cdot 55 \\ \underline{255} \end{array}$$

4 *The Practical Gauger.*

$$\begin{array}{r}
 55 \\
 55 \\
 \hline
 275 \\
 275 \\
 \hline
 282) 3025 \text{ (10 Gallons.)} \\
 \hline
 205
 \end{array}$$

110

55

*An Oblong,
or
Parallelogram.*

$$\begin{array}{r}
 55 \\
 110 \\
 \hline
 550 \\
 55 \\
 \hline
 282) 6050 \text{ (21 Gallons.)} \\
 410 \\
 \hline
 128
 \end{array}$$

One

The Practical Gauger. 5

One contains 10 Gallons, and $\frac{205}{282}$ parts of a Gallon; the other 21 Gallons, and $\frac{128}{82}$ of a Gallon. To reduce which Fraction into Pints, you need only multiply the Remainder or Numerator by 8, and divide by the old Divisor; and the Quote will be the Pints contain'd in that Fraction.

To find the Area or Content of one Inch of a Back or Tun, in the form of a Triangle, in Ale-Gallons.

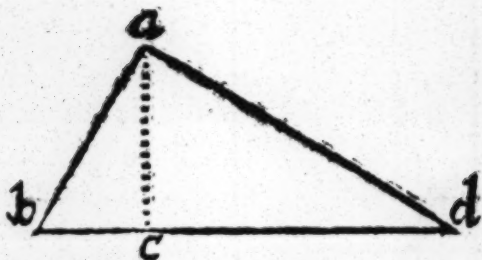
The Rule is,

Multiply the Line *a c* (*viz.* the Line falling perpendicularly from any Angle on its opposite Base) by half the Line *b c d*; here the Base, and the Product divide by 282, the Quotient will be the Ale-Gallons contained in one Inch of depth upon that Triangle.

B 3

Example.

Example



$$ac = 120$$

$$\triangle bcd = 150$$

$$\begin{array}{r} 282 \overline{) 18000} \\ \underline{1080} \\ 234 \\ 8 \end{array}$$

A. Gall. Pints.

(63 : 6 $\frac{3}{4}$:

$$\begin{array}{r} 282 \overline{) 1872} \\ \underline{462} \end{array}$$

(6 $\frac{1}{2}$ $\frac{8}{8}$, or , $\frac{3}{4}$:

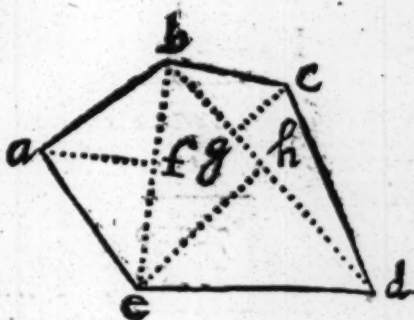
There is contained in the first Inch
of this Back or Tun, 63 Ale-Gallons,
6 Pints, and above an half.

But

The Practical Gauger. 7

But admitting the Back or Tun be of an irregular Form, divide it into Triangles, and let fall Perpendiculars in each, and find their several *Areas*, as in the last Example; then add them together, and you have the Content or *Area* of the whole Figure.

Example.



First, I find the Triangle *abe*.

$$\begin{array}{rcl} af & = & 230 \\ \frac{1}{2} be & = & 130 \end{array}$$

$$29900$$

B. 4,

Now

8 *The Practical Gauger.*

Now in the other two Triangles, the two Perpendiculars falling upon one common Base, I multiply the Summ of the Perpendiculars by half the Base; and that Product is the Area or Content of both Triangles.

$$cg = 60$$

$$he = 220$$

$$280$$

$$\frac{1}{2}bd = 250$$

$$14000$$

$$56$$

$$70000$$

$$29900$$

Ale-Gall.

$$282) \quad 99900 \quad (354 \frac{24}{41}$$

$$1530$$

$$1200$$

$$72$$

So

The Practical Gauger. 9

So doth one Idch of this Back or Tun appear to contain of Ale-Measure, 9 Barrels, 3 Firkins, and 3 Gallons.

Here note, That formerly the Ale-Gallon was accompted to contain 288 $\frac{1}{4}$ Cube-Inches; but by the care and pains of my good Friend, Mr. *Nicholas Gunton*, the just quantity of the Quart, remaining in the Hands of the Chamberlains of his Majesty's Exchequer, appears to be 70 $\frac{1}{2}$; as some of late have found to their no small cost. And I am of opinion, That if the Wine-Gallon were carefully examined, it would prove to contain less than it is commonly reputed to do, by so much as would improve the Revenue of the Crown some Thousands *per Annum*.

Now, having shewed you how to find the superficial Quantity of any Figure enclos'd or bounded by Right Lines, if the Dimensions be alike above and below, multiply the *Area* by the Depth, and you have Con-
B 5 tent

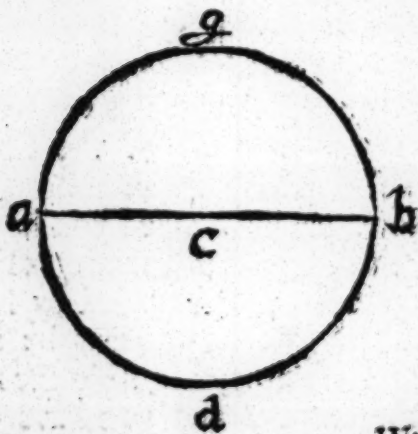
10 *The Practical Ganger.*

tent of the whole; or by any part, and you will find thereby the Solidity of that part.

But if the Dimensions above and below be unequal, take your Dimensions, or cross Diameters, at every Foot, or half Foot, and so find the Solidity.

Of a Circle.

A Circle is a Figure contain'd or bounded by one Line, which is call'd the Circumference; as the Line *abgd*.



Within

The Practical Ganger. 11

Within which Line there is a Point, from whence, all Lines drawn from the Circumference, are equal; and that Point is called the Center, as the Point *c*; and through which, all Right Lines drawn from one side of the Circumference to the other, divide the Circle into two equal parts, and that Line is called the Diameter, as the Line *a c b*; and the two parts of the Circle, divided by the Diameter, are called Semi-Circles, as the part *a c b g* or *a c b d*.

And although there is not yet found any true proportion between a Square and a Circle, (a square Inch being our common Measure,) yet is there an Approximation found by *Vanculen*, which comes almost infinitely near the truth, being as Unity to 3. 14152, &c. to the Square of the Diameter. But the old Proportion comes near enough for common Practice, viz. As 14 to 11, so is the Square of the Diameter to the Area, in square Inches, &c.

Example.

12 *The Practical Ganger.*

Example.

$$\text{Diameter } ab = 80$$

$$\text{Square of } ab = 6400$$

$$14 \cdot 11 :: 6400 \cdot 5028 \cdot \text{Area in Square Inches.}$$

$$6400$$

$$6400$$

$$14) 70400 \quad (5028$$

$$0040$$

$$120$$

$$8$$

Which *Area* in square Inches divided by 282, Quote the Ale-Gallons contain'd in one Inch of depth in that Circle, or by 231, the Wine-Gallons.

Example.

Example.

A. Gall. Pints.

$$\begin{array}{r} 282 \overline{) 5028} \quad (17 : 6 \frac{90}{141} \\ 2078 \end{array}$$

$$\begin{array}{r} 234 \\ 8 \end{array}$$

$$\begin{array}{r} 282 \overline{) 1872} \quad (6 \frac{90}{141} \\ 180 \end{array}$$

W. Gall. Pints.

$$\begin{array}{r} 231 \overline{) 5028} \quad (21 : 6 \frac{20}{31} \\ 408 \end{array}$$

$$\begin{array}{r} 177 \\ 8 \end{array}$$

$$\begin{array}{r} 231 \overline{) 1416} \quad (6 \frac{20}{31} \\ 30 \end{array}$$

But I would advise my young Gauger not to trouble himself with the Inches,

14 *The Practical Ganger.*

Inches, his business being to find the Gallons the shortest way he can : In order whereunto, let him observe the following Rule :

Having the Diameter of a Circle in Inches, to find the Area or Content in Ale or Wine-Gallons.

The Rule.

Square the Diameter, *viz.* (multiply it by it self) and that Square or Product divide by 359 for Ale, and 294 for Wine, and the Quoties will be the Ale or Wine-Gallons respectively, that shall be contain'd in a Circle of that Diameter, and one Inch in depth.

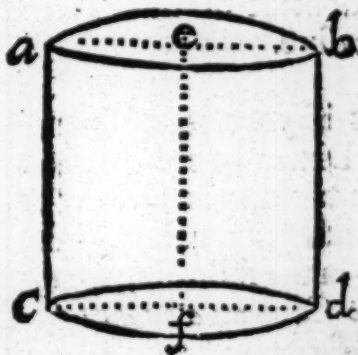
$$\begin{array}{r}
 ab = 80 \\
 80 \\
 \hline
 \text{Ale-Gall.} \\
 359 \overline{) 6100} \quad (17 \frac{227}{359} \\
 \underline{2810} \\
 297
 \end{array}$$

Wine-Gall.

294) 6400 ($21 \frac{1}{4} \frac{3}{7}$
520 prout *supra*.

226

If the Tun be in form of a Cylinder, viz. like the Rolling-stone of a Garden, the Circles above and below of equal Diameters, then to find the Content of that Tun, or any part thereof; you need only find the *Area* of the Circle, and multiply by the whole Depth, or such part as you desire, and the Product will be the Solidity of the whole, or part, respectively.



Diameter

16 The Practical Ganger.

Diameter a b or c d = 80 Inches, the Area before found to be 17 Gallons, 6 Pints; and the Depth = 40 Inches: To find the Content.

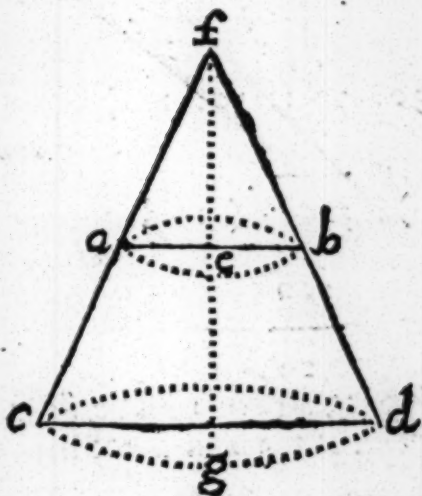
$$\begin{aligned} \text{Area} &= 17 : 6 \\ \text{Depth } e f &= 40 \end{aligned}$$

$$\begin{array}{r} 680 \\ 30 \\ \hline \text{Bar. Firk. Gall.} \\ 36) 710 \text{ (19} \text{---} 2 \text{---} 8 \\ 350 \\ \hline 26 \end{array}$$

The Content of this Tun in Beer-Measure.

But if your round Tun, have unequal Dimensions above and below; it is then taken to be the part of a Cone, or round Pyramid; having the Top cut off as in the following Diagram; the whole Cone = a b c d e f g, the Part or Frustum = a b c d e g.

Having



Having the two Diameters and Depth of the Tun, to produce the whole Cone, the Rule is by Proportion thus :

As the Semi-difference of Diameters, is to half the Diameter at the Base ; so is the height of the Frustrum, to the Cone's whole Axis.

Admit ab 80, cd 140, eg 50, then is the Difference 60, half the Base 70.

Example.

18 *The Practical Ganger.*

Example.

$$30. \quad 70 :: 50. \quad 116\frac{2}{3} \text{ Cones Axis} \\ \quad \quad \quad 50 \quad \quad \quad \text{or f. g.}$$

$$\begin{array}{r} 30 \cdot) \quad 3500 \quad (\quad 116\frac{2}{3} \\ \quad \quad 50 \\ \quad \quad 200 \\ \hline \quad \quad 20 \end{array}$$

Having all these Dimensions, the Content of the Tun is not hard to be found.

For if you find the *Area* of the Base, and multiply that *Area* by $\frac{1}{3}$ of the *Altitude*, or $\frac{1}{3}$ of the *Area* by the whole *Altitude*, the *Product* is the *Solidity* of the whole Cone. Then having found the whole Cone, find also the lesser Cone, and subduct that from the greater, the remainder will be the Content of the *Frustum*.

Or if you would find the Content of the *Frustum*, without producing the whole Cone,

The

The Rule is,

Multiply the Summ of the two Diameters by it self, then multiply the two Diameters by each other, subtract the lesser Product from the greater, and the Remainder multiply by the depth, the last Product divide by 1077, and the Quote is the Ale-Gallons contain'd in that Tun.

$$\text{Diameter } a b = 80$$

$$\text{Diameter } c d = 140$$

$$\text{Sum of } a b \text{ and } c d = 220$$

$$220$$

$$4400$$

$$4400$$

$$\text{Product} = 48400$$

$$140$$

$$80$$

$$\text{Product} = 11200$$

Greater

20 *The Practical Gauger.*

Greater Product = 48400

Lesser Product = 11200

Remainder = 37200

Depth *eg* = 50

A. Gall.

1077) 1860000 (1727

7830

2910

7560

21

The Content appears to be 1727 Ale-Gallons, or 47 Barrels, 3 Firkins, 8 Gallons.

If it be desir'd in Feet or Inches, you may find all the Differences of the Diameters, at every Foot, half Foot, or Inch, by this Proportion:

As the whole Depth, is to the Difference of Diameters; so is any part of the Depth, to its respective difference of Diameter.

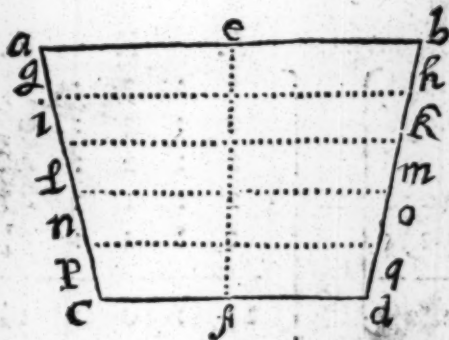
Then by Addition or Subduction, you have the Diameters all the way upward or downward.

O12

The Practical Gauger: 21

Or, if you please, you may take the Diameters actually, in the midst of every Foot or half Foot, and seek its *Area* in the Table of *Areas* hereto annex'd; which *Area*, multiply'd by the Foot or half Foot, gives the Solidity accordingly, without any sensible Error. This way I would oblige the young *Gauger* to, if he be not ready at Proportion.

Example,



$$ab = 80$$

$$cd = 70$$

$$ef = 30$$

All

All these mean Diameters cut this Tun into so many Cylinders.

$$\text{Then is } \left\{ \begin{array}{l} g b = 79 \\ i k = 77 \\ l m = 75 \\ n o = 73 \\ p q = 71 \end{array} \right\} \text{ Its Area } \left\{ \begin{array}{l} 17.382 \\ 16.513 \\ 15.666 \\ 14.841 \\ 14.039 \end{array} \right.$$

Now, having the *Area* of each Circle, which is an Arithmetical Mean of the half Foot, multiply this *Area* by 6, and the Product is in the Solidity of that half Foot.

| | B. | F. | G. |
|---------|-------|-------|-----------------|
| 104.292 | 2 | 3 | 5 $\frac{1}{4}$ |
| 99.078 | 2 | 3 | 0 |
| 93.996 | 2 | 2 | 4 |
| 89.046 | 2 | 1 | 8 |
| 84.234 | 2 | 1 | 3 $\frac{1}{4}$ |
| <hr/> | <hr/> | <hr/> | <hr/> |
| 470.646 | 13 | 0 | 2 $\frac{1}{2}$ |

This Tun cast up by the Rule p. 19.

80

70

5600

80

The Practical Gauger. 23

$$\begin{array}{r}
 80 \\
 70 \\
 \hline
 150 \\
 150 \\
 \hline
 7500 \\
 150 \\
 \hline
 22500 \\
 5600 \\
 \hline
 16900 \\
 30 \\
 \hline
 \text{Gall.}
 \end{array}$$

$$\begin{array}{r}
 1077 \) \ 507000 \ (\ 470 \ , \ 8 \frac{10}{77} \\
 7620 \\
 810
 \end{array}$$

Whereby appears not a Gallon difference.

If the Conjugate or Cross Diameters above and below are not equal, then do *Geometricians* call that Tun, Elliptical; to reduce which to a Circle, there ought to be a Geometrical Mean taken, but the common practice is

24 *The Practical Gauger.*

is to add them together, and take the half; which, if the Diameters differ not much, the Error is the less.

Coppers are commonly taken at every 6 Inches, as that Tun in *p. 21*.

To find the Content of a Copper's Crown, take this Rule :

Square the Diameter at the Base ; to this add $\frac{3}{4}$ of the Square of the Crown's Altitude; the Summ, multiply by the Altitude ; the last Product divide by 718 ; the Quote is the Ale-Gallons contained in that Crown.

To find the Content of the Mash-Tun, in Quarters, Bushels, and Gallons.

There can be no certain Rule in taking the depth of the Goods, by reason of the difference in the Goodness of Malt, some spending it self much more in the wetting than other; yet that considered, there may be some estimate given thereto, whereby a very considerable Fraud may be discovered.

In

The Practical Gauger. 25

In a square Mash-Tun, divide the Product of the length and breadth by 227 for indifferent, or by 200 for the finest; and the Product will be the Gallons wetted. And for round Mash-Tuns, let your Divisors be 288, or 260, respectively.

For *Cask-Gauging*, wholly full, I have given many Precepts and Examples in a Treatise call'd *The Merchant's Companion*, printed in the Year 1674. but that the Reader may not be left here wholly without, take the following Rule, which considers the Cask as the *Frustum* of a Spheroid, that being the most general Form.

To find the Content of a Cask in Ale or Wine-Gallons.

The Rule.

To the doubled Square of the Bounding-Diameter add the Square of the Head-Diameter, and that Summ
C mul-

26 *The Practical Ganger.*

multiply by the Cask's length, the last Product divide by 1077, and the Quote is the Ale-Gallons; or by 882, and the Quote is the Wine-Gallons contain'd in that Cask.

Example.

A Cask { BounDiameter 28
Head-Diameter- 25 } Inches
Length ——— 36 }

Head-Diameter = 25

25

—

125

50

—

The Square = 625

BounDiameter = 28

28

—

224

56

—

The Square = 784

784

The Practical Gauger. 27

784

784

625

2193

Cask's Length \pm 36

13158

6579

A. Gall. Pints.

1077) 78948 (73 : 2 $\frac{46}{1077}$

3558

327

8

1077) 2616 (2

462

The Content of this Cask is 73 Ale-Gallons, 2 Pints, and almost an half.

Or, by the Table of *Areas*, thus:

To twice the *Area* of the Boun-
Circle in Gallons and parts, add the
C 2 *Area*

28 *The Practical Gauger.*

Area of the Head-Circle; the Summ of these multiply by $\frac{1}{3}$ of the Cask's length, and the Product is the Content in Gallons and parts, as in the former Example.

$$\text{Area of } 28 = 2.184$$

$$2.184$$

$$\text{Area of } 25 = 1.741$$

$$6.109$$

$$\frac{1}{3} \text{ of the Length} = 12$$

$$\text{The Content} = 73.308 \text{ Ale-Gall.}$$

Which Fraction being reduc'd, is 2 Pints and better, as was before found.

After the same manner, you may Gauge a Wine-Cask by the Tables of *Areas* for that purpose, beginning pag. 39. The matter being plain and obvious, another Example in this place is needless.

A

T A B L E

O F

AREAS of CIRCLES

I N

ALE-GALLONS

A N D

MILLESIMAL PARTS,

To every Quarter of an Inch;

F R O M

One to Twelve Foot Diameter.

C. 3

Circles

Circles Areas in Ale-Gallons.

| Inches. | Areas. | .25 | .5 | .27 |
|---------|--------|-------|-------|-------|
| 10 | 0.278 | 0.293 | 0.307 | 0.322 |
| 11 | 0.337 | 0.352 | 0.368 | 0.384 |
| 12 | 0.401 | 0.418 | 0.435 | 0.453 |
| 13 | 0.471 | 0.489 | 0.508 | 0.527 |
| 14 | 0.546 | 0.565 | 0.586 | 0.606 |
| 15 | 0.627 | 0.648 | 0.669 | 0.691 |
| 16 | 0.713 | 0.731 | 0.758 | 0.781 |
| 17 | 0.805 | 0.824 | 0.853 | 0.877 |
| 18 | 0.902 | 0.923 | 0.953 | 0.979 |
| 19 | 1.005 | 1.027 | 1.059 | 1.086 |
| 20 | 1.114 | 1.142 | 1.170 | 1.199 |
| 21 | 1.228 | 1.258 | 1.287 | 1.317 |
| 22 | 1.348 | 1.379 | 1.410 | 1.441 |
| 23 | 1.473 | 1.505 | 1.538 | 1.571 |
| 24 | 1.604 | 1.638 | 1.672 | 1.706 |
| 25 | 1.741 | 1.776 | 1.811 | 1.847 |
| 26 | 1.883 | 1.919 | 1.956 | 1.993 |
| 27 | 2.030 | 2.068 | 2.106 | 2.175 |
| 28 | 2.184 | 2.223 | 2.262 | 2.302 |
| 29 | 2.342 | 2.383 | 2.424 | 2.465 |

Circles Areas in Ale-Gallons.

| Inches. | Areas. | .25 | .5 | .75 |
|---------|--------|-------|-------|-------|
| 30 | 2.507 | 2.549 | 2.591 | 2.634 |
| 31 | 2.676 | 2.720 | 2.764 | 2.808 |
| 32 | 2.852 | 2.896 | 2.942 | 2.987 |
| 33 | 3.033 | 3.079 | 3.126 | 3.172 |
| 34 | 3.220 | 3.267 | 3.315 | 3.363 |
| 35 | 3.412 | 3.461 | 3.510 | 3.560 |
| 36 | 3.610 | 3.660 | 3.710 | 3.761 |
| 37 | 3.813 | 3.864 | 3.916 | 3.969 |
| 38 | 4.022 | 4.075 | 4.128 | 4.182 |
| 39 | 4.236 | 4.291 | 4.345 | 4.401 |
| 40 | 4.456 | 4.512 | 4.568 | 4.625 |
| 41 | 4.682 | 4.739 | 4.797 | 4.855 |
| 42 | 4.913 | 4.972 | 5.031 | 5.090 |
| 43 | 5.150 | 5.210 | 5.270 | 5.331 |
| 44 | 5.392 | 5.453 | 5.515 | 5.577 |
| 45 | 5.640 | 5.703 | 5.766 | 5.829 |
| 46 | 5.893 | 5.957 | 6.022 | 6.087 |
| 47 | 6.152 | 6.218 | 6.284 | 6.350 |
| 48 | 6.417 | 6.484 | 6.551 | 6.619 |
| 49 | 6.687 | 6.755 | 6.824 | 6.893 |

32 *The Practical Gauger.*

Circles Areas in Ale-Gallons.

| Inches. | Area. | .25 | .5 | .75 |
|---------|--------|--------|--------|--------|
| 50 | 6.963 | 7.033 | 7.103 | 7.173 |
| 51 | 7.244 | 7.315 | 7.387 | 7.459 |
| 52 | 7.531 | 7.603 | 7.676 | 7.750 |
| 53 | 7.823 | 7.897 | 7.972 | 8.046 |
| 54 | 8.121 | 8.197 | 8.272 | 8.348 |
| 55 | 8.425 | 8.502 | 8.579 | 8.656 |
| 56 | 8.734 | 8.812 | 8.891 | 8.970 |
| 57 | 9.049 | 9.128 | 9.208 | 9.288 |
| 58 | 9.369 | 9.450 | 9.531 | 9.613 |
| 59 | 9.695 | 9.777 | 9.860 | 9.943 |
| 60 | 10.026 | 10.110 | 10.194 | 10.279 |
| 61 | 10.363 | 10.448 | 10.534 | 10.620 |
| 62 | 10.706 | 10.792 | 10.879 | 10.970 |
| 63 | 11.054 | 11.142 | 11.230 | 11.320 |
| 64 | 11.408 | 11.497 | 11.587 | 11.677 |
| 65 | 11.767 | 11.868 | 11.949 | 12.040 |
| 66 | 12.132 | 12.224 | 12.316 | 12.409 |
| 67 | 12.502 | 12.596 | 12.690 | 12.784 |
| 68 | 12.878 | 12.973 | 13.068 | 13.164 |
| 69 | 13.260 | 13.356 | 13.453 | 13.550 |

Circles Areas in Ale-Gallons.

| Inches. | Area. | .25 | .5 | .75 |
|---------|--------|--------|--------|--------|
| 70 | 13.647 | 13.745 | 13.843 | 13.941 |
| 71 | 14.040 | 14.139 | 14.238 | 14.338 |
| 72 | 14.438 | 14.539 | 14.639 | 14.740 |
| 73 | 14.841 | 14.944 | 14.046 | 15.148 |
| 74 | 15.251 | 15.354 | 15.458 | 15.562 |
| 75 | 15.666 | 15.771 | 15.876 | 15.981 |
| 76 | 16.087 | 16.193 | 16.299 | 16.406 |
| 77 | 16.513 | 16.620 | 16.728 | 16.836 |
| 78 | 16.945 | 17.053 | 17.162 | 17.270 |
| 79 | 17.382 | 17.492 | 17.603 | 17.713 |
| 80 | 17.825 | 17.936 | 18.048 | 18.160 |
| 81 | 18.273 | 18.386 | 18.499 | 18.613 |
| 82 | 18.727 | 18.841 | 18.956 | 19.071 |
| 83 | 19.187 | 19.302 | 19.418 | 19.535 |
| 84 | 19.652 | 19.769 | 19.886 | 20.004 |
| 85 | 20.122 | 20.241 | 20.360 | 20.479 |
| 86 | 20.599 | 20.718 | 20.840 | 20.959 |
| 87 | 21.081 | 21.202 | 21.323 | 21.445 |
| 88 | 21.560 | 21.691 | 21.814 | 21.937 |
| 89 | 22.061 | 22.185 | 22.309 | 22.434 |

Circles *Areas* in Ale-Gallons.

| Inches. | Area. | .25 | .5 | .75 |
|---------|--------|--------|--------|--------|
| 90 | 22.559 | 22.685 | 22.811 | 22.937 |
| 91 | 23.063 | 23.190 | 23.318 | 23.445 |
| 92 | 23.573 | 23.701 | 23.830 | 23.959 |
| 93 | 24.088 | 24.217 | 24.348 | 24.478 |
| 94 | 24.609 | 24.740 | 24.872 | 25.003 |
| 95 | 25.136 | 25.268 | 25.401 | 25.534 |
| 96 | 25.667 | 25.801 | 25.936 | 26.070 |
| 97 | 26.205 | 26.340 | 26.476 | 26.612 |
| 98 | 26.748 | 26.885 | 27.022 | 27.159 |
| 99 | 27.297 | 27.435 | 27.573 | 27.712 |
| 100 | 27.851 | 27.990 | 28.130 | 28.270 |
| 101 | 28.411 | 28.552 | 28.693 | 28.834 |
| 102 | 28.976 | 29.118 | 29.261 | 29.404 |
| 103 | 29.547 | 29.691 | 29.835 | 29.979 |
| 104 | 30.124 | 30.269 | 30.414 | 30.560 |
| 105 | 30.706 | 30.852 | 30.999 | 31.146 |
| 106 | 31.293 | 31.441 | 31.589 | 31.738 |
| 107 | 31.887 | 32.036 | 32.185 | 32.335 |
| 108 | 32.485 | 32.636 | 32.787 | 32.970 |
| 109 | 33.090 | 33.242 | 33.394 | 33.577 |

Circles Areas in Ale-Gallons.

| Inches. | Area. | .25 | .5 | .75 |
|---------|--------|--------|--------|--------|
| 110 | 33.700 | 33.853 | 34.007 | 34.192 |
| 111 | 34.315 | 34.470 | 34.625 | 34.812 |
| 112 | 35.936 | 35.093 | 35.249 | 35.437 |
| 113 | 35.563 | 35.721 | 35.878 | 36.037 |
| 114 | 36.195 | 36.354 | 36.513 | 36.673 |
| 115 | 36.833 | 36.993 | 37.154 | 37.315 |
| 116 | 37.476 | 37.638 | 37.800 | 37.962 |
| 117 | 38.125 | 38.288 | 38.452 | 38.616 |
| 118 | 38.780 | 38.944 | 39.109 | 39.274 |
| 119 | 39.440 | 39.606 | 39.772 | 39.938 |
| 120 | 40.105 | 40.273 | 40.440 | 40.608 |
| 121 | 40.777 | 40.945 | 41.114 | 41.284 |
| 122 | 41.453 | 41.623 | 41.794 | 41.965 |
| 123 | 42.136 | 42.307 | 42.479 | 42.651 |
| 124 | 42.824 | 42.997 | 43.170 | 43.343 |
| 125 | 43.517 | 43.692 | 43.866 | 44.041 |
| 126 | 44.216 | 44.392 | 44.568 | 44.744 |
| 127 | 44.921 | 45.098 | 45.275 | 45.453 |
| 128 | 45.631 | 45.809 | 45.988 | 46.167 |
| 129 | 46.347 | 46.527 | 46.707 | 46.887 |

Circles Areas in Ale-Gallons.

| Inches. | Area. | .25 | .5 | .75 |
|---------|--------|--------|--------|--------|
| 130 | 47.068 | 47.249 | 47.431 | 47.613 |
| 131 | 47.795 | 47.978 | 48.161 | 48.384 |
| 132 | 48.527 | 48.712 | 48.896 | 49.081 |
| 133 | 49.266 | 49.451 | 49.637 | 49.823 |
| 134 | 50.009 | 50.196 | 50.383 | 50.571 |
| 135 | 50.758 | 50.946 | 51.135 | 51.324 |
| 136 | 51.513 | 51.703 | 51.893 | 52.083 |
| 137 | 52.273 | 52.464 | 52.656 | 52.847 |
| 138 | 53.039 | 53.232 | 53.424 | 53.618 |
| 139 | 53.811 | 54.005 | 54.199 | 54.393 |
| 140 | 54.588 | 54.783 | 54.979 | 55.174 |
| 141 | 55.371 | 55.567 | 55.764 | 55.961 |
| 142 | 56.159 | 56.357 | 56.555 | 56.754 |
| 143 | 56.953 | 57.152 | 57.352 | 57.592 |
| 144 | 57.752 | 57.953 | 58.154 | 58.395 |

100.000 / 0027

778

2020

To

The Practical Gauger. 37

To make any Number in the precedent Table of *Areas* in Ale-Gallons.

The Rule is,

Divide the Square of the Diameter by 359, and the Quote exhibits the *Area* of that Circle in Ale-Gallons.

Example.

$$\begin{array}{r} 30 \\ 30 \\ \hline 359 \overline{) 900} \quad (2.507 > \\ \underline{1820} \\ 2500 \end{array}$$

Thus may be made any Number, greater or lesser than the Table does exhibit, the difference here being not $\frac{1}{1000}$ part of a Gallon.

Or, by a continual Collection of the first and second Differences, the Table may be made as *Michael Dary* intimates in his Book of Gauging, pag. 85. chap. 8. parag. 1.

To

38 *The Practical Gauger.*

To make a Table of $\frac{1}{3}$ ds of *Areas* of Circles in Wine-Gallons, (which was formerly in this Book, but now supplied with whole *Areas*, as follows.

The Rule is,

Multiply $\frac{1}{3}$ of the Square of the Diameter by .0034, or multiply the whole Square by .0034, and the Product divide by 3; and the Product of the former Work, or the Quotient of the latter, is the Circles *Area*.

Example.

What is the $\frac{1}{3}$ of the Area of that Circle in Wine-Gallons, whose Diameter is 30 Inches?

Diameter = 30

30

The Square = 900

| | |
|---------------------------|----------|
| $\frac{1}{3}$ of q. = 300 | q. = 900 |
| Multiplic' .0034 | .0034 |
| 1200 | 3600 |
| 900 | 2700 |

Answer 1.0200 3) 3.0600 W.G. (1.02 A

A
T A B L E
O F

AREAS of CIRCLES
I N
WINE-GALLONS.

CALCULATED

To every Quarter of an Inch,

F R O M

One to Sixty Inches Diameter.

40 *The Practical Gauger.*

Circles Areas in Wine-Gallons.

| Inches. | Area. | $\frac{.25}{\frac{1}{4}}$ | $\frac{.5}{\frac{1}{2}}$ | $\frac{.75}{\frac{3}{4}}$ |
|---------|--------|---------------------------|--------------------------|---------------------------|
| 1 | .0034 | .0053 | .0077 | .0104 |
| 2 | .0136 | .0172 | .0212 | .0257 |
| 3 | .0306 | .0359 | .0416 | .0478 |
| 4 | .0544 | .0614 | .0688 | .0767 |
| 5 | .0850 | .0937 | .1028 | .1124 |
| 6 | .1224 | .1328 | .1436 | .1549 |
| 7 | .1666 | .1787 | .1912 | .2042 |
| 8 | .2176 | .2314 | .2456 | .2603 |
| 9 | .2754 | .2909 | .3069 | .3232 |
| 10 | .3400 | .3572 | .3748 | .3929 |
| 11 | .4114 | .4303 | .4497 | .4694 |
| 12 | .4896 | .5102 | .5312 | .5527 |
| 13 | .5746 | .5969 | .6197 | .6428 |
| 14 | .6664 | .6904 | .7148 | .7397 |
| 15 | .7650 | .7907 | .8169 | .8434 |
| 16 | .8704 | .8978 | .9257 | .9539 |
| 17 | .9826 | 1.0117 | 1.0413 | 1.0712 |
| 18 | 1.1016 | 1.1324 | 1.1637 | 1.1955 |
| 19 | 1.2274 | 1.2599 | 1.2928 | 1.3262 |
| 20 | 1.3600 | 1.3942 | 1.4288 | 1.4639 |

Circles Areas in Wine-Gallons.

| Inches. | Area. | .25 $\frac{1}{4}$ | .5 $\frac{1}{2}$ | .27 $\frac{1}{4}$ |
|---------|--------|----------------------|---------------------|----------------------|
| 21 | 1.4994 | 1.5353 | 1.5717 | 1.6084 |
| 22 | 1.6456 | 1.6832 | 1.7213 | 1.7600 |
| 23 | 1.7986 | 1.8379 | 1.8777 | 1.9180 |
| 24 | 1.9584 | 1.9994 | 1.0409 | 2.0827 |
| 25 | 2.1250 | 2.1677 | 2.2108 | 2.2544 |
| 26 | 2.2984 | 2.3428 | 2.3876 | 2.4329 |
| 27 | 2.4786 | 2.5247 | 2.5712 | 2.6182 |
| 28 | 2.6656 | 2.7134 | 2.7616 | 2.8103 |
| 29 | 2.8594 | 2.9089 | 2.9589 | 3.0093 |
| 30 | 3.0600 | 3.1112 | 3.1628 | 3.2149 |
| 31 | 3.2674 | 3.3203 | 3.3736 | 3.4274 |
| 32 | 3.4816 | 3.5362 | 3.5912 | 3.6467 |
| 33 | 3.7026 | 3.7589 | 3.8156 | 3.8728 |
| 34 | 3.9304 | 3.9884 | 4.0468 | 4.1057 |
| 35 | 4.1650 | 4.2247 | 4.2849 | 4.3454 |
| 36 | 4.4064 | 4.4678 | 4.5297 | 4.5919 |
| 37 | 4.6546 | 4.7177 | 4.7813 | 4.8452 |
| 38 | 4.9096 | 4.9744 | 5.0897 | 5.1053 |
| 39 | 5.1714 | 5.2379 | 5.3049 | 5.3722 |
| 40 | 5.4400 | 5.5082 | 5.5760 | 5.6459 |

42 *The Practical Gauger.*

Circles Areas in Wine-Gallons.

| Inches. | Area. | $.25$ $\frac{1}{4}$ | $.5$ $\frac{1}{2}$ | $.75$ $\frac{3}{4}$ |
|---------|---------|------------------------|-----------------------|------------------------|
| 41 | 5.7154 | 5.7853 | 5.8556 | 5.9164 |
| 42 | 5.9976 | 6.0091 | 6.1412 | 6.2137 |
| 43 | 6.2866 | 6.3599 | 6.4336 | 6.5078 |
| 44 | 6.5824 | 6.6574 | 6.7328 | 6.8087 |
| 45 | 6.8850 | 6.9617 | 7.0389 | 7.1164 |
| 46 | 7.1944 | 7.2728 | 7.3516 | 7.4309 |
| 47 | 7.5106 | 7.5907 | 7.6713 | 7.7522 |
| 48 | 7.8336 | 7.9154 | 7.9976 | 8.0803 |
| 49 | 8.1634 | 8.2469 | 8.3309 | 8.4152 |
| 50 | 8.5000 | 8.5851 | 8.6708 | 8.7569 |
| 51 | 8.8434 | 8.9303 | 9.0176 | 9.1054 |
| 52 | 9.1936 | 9.2822 | 9.3712 | 9.4607 |
| 53 | 9.5506 | 9.6429 | 9.7316 | 9.8228 |
| 54 | 9.9144 | 10.0664 | 10.0988 | 10.1917 |
| 55 | 10.3850 | 10.3787 | 10.4728 | 10.5674 |
| 56 | 10.6624 | 10.7578 | 10.8536 | 10.9499 |
| 57 | 11.0466 | 11.1437 | 11.2412 | 11.3892 |
| 58 | 11.4376 | 11.5364 | 11.6356 | 11.7353 |
| 59 | 11.8354 | 11.9356 | 12.0368 | 12.1382 |
| 60 | 12.2400 | <i>Finis Tabula.</i> | | |

To make any Number in the precedent Table, the Rule is thus :

Multiply the Square of any Diameter by 0.0034, and the Product is the Wine-Gallons.

Example

Suppose the Diameter be 27,

$$\begin{array}{r}
 27 \\
 27 \\
 \hline
 180 \\
 54 \\
 \hline
 729 \\
 0.0034 \\
 \hline
 2916 \\
 2187 \\
 \hline
 2.4786
 \end{array}$$

Thus you make any Number greater or lesser, which you may find in the Table, and its use, as that of *Areas* of Ale-Gallons, *pag.* 28.

To

44 *The Practical Gauger.*

To re- $\left\{ \begin{array}{l} \text{Wine} \\ \text{Beer} \end{array} \right\}$ into $\left\{ \begin{array}{l} \text{Beer} \\ \text{Wine} \end{array} \right\}$ Gallons,

The Proportions are these, *viz.*

1. As 231 is to 282, so is 100 to 122 $\frac{1}{4}$.

2. As 282 is to 231, so is 100 to 82—

Therefore if you multiply Wine-Gallons by .82—decimally, it gives Beer-Gallons; and if you multiply Beer-Gallons by 1.22 $\frac{1}{4}$, it gives Wine-Gallons, reduced thereunto, &c.

Example.

108.47 Beer-Gallons
By 1.22

21694
21694
10847

132.3334 Wine-Gallons.

So 132 $\frac{1}{4}$ Wine-Gallons
By .82

2648
10592

108.568 Beer-Gallons.

A TABLE of Excise for Victuallers, at 4 s. 9 d. per Barrel Strong, and 1 s. 3 d. for Small.

Strong Beer or Ale.

| Bar. | l. | s. | d. | f. |
|---------|-----|----|----|----|
| 1 Firke | 0 | 1 | 2 | 1 |
| 2 Firke | 0 | 2 | 4 | 2 |
| 3 Firke | 0 | 3 | 6 | 3 |
| 1 | 0 | 4 | 9 | 0 |
| 2 | 0 | 9 | 6 | 0 |
| 3 | 0 | 14 | 3 | 0 |
| 4 | 0 | 19 | 0 | 0 |
| 5 | 1 | 3 | 9 | 0 |
| 6 | 1 | 8 | 6 | 0 |
| 7 | 1 | 13 | 3 | 0 |
| 8 | 1 | 18 | 0 | 0 |
| 9 | 2 | 2 | 9 | 0 |
| 10 | 2 | 7 | 6 | 0 |
| 20 | 4 | 15 | 0 | 0 |
| 30 | 7 | 2 | 6 | 0 |
| 40 | 9 | 10 | 0 | 0 |
| 50 | 11 | 17 | 6 | 0 |
| 60 | 14 | 5 | 0 | 0 |
| 70 | 16 | 12 | 6 | 0 |
| 80 | 19 | 0 | 0 | 0 |
| 90 | 21 | 7 | 6 | 0 |
| 100 | 23 | 15 | 0 | 0 |
| 200 | 47 | 10 | 0 | 0 |
| 300 | 71 | 5 | 0 | 0 |
| 400 | 95 | 0 | 0 | 0 |
| 500 | 118 | 15 | 0 | 0 |

Small Beer or Ale.

| Bar. | l. | s. | d. | f. |
|---------|----|----|----|----|
| 1 Firke | 0 | 0 | 3 | 3 |
| 2 Firke | 0 | 0 | 7 | 2 |
| 3 Firke | 0 | 0 | 11 | 1 |
| 1 | 0 | 1 | 3 | 0 |
| 2 | 0 | 2 | 6 | 0 |
| 3 | 0 | 3 | 9 | 0 |
| 4 | 0 | 5 | 0 | 0 |
| 5 | 0 | 6 | 3 | 0 |
| 6 | 0 | 7 | 6 | 0 |
| 7 | 0 | 8 | 9 | 0 |
| 8 | 0 | 10 | 0 | 0 |
| 9 | 0 | 11 | 3 | 0 |
| 10 | 0 | 12 | 6 | 0 |
| 20 | 1 | 5 | 0 | 0 |
| 30 | 1 | 17 | 6 | 0 |
| 40 | 2 | 10 | 0 | 0 |
| 50 | 3 | 2 | 6 | 0 |
| 60 | 3 | 15 | 0 | 0 |
| 70 | 4 | 7 | 6 | 0 |
| 80 | 5 | 0 | 0 | 0 |
| 90 | 5 | 12 | 6 | 0 |
| 100 | 6 | 5 | 0 | 0 |
| 200 | 12 | 10 | 0 | 0 |
| 300 | 18 | 15 | 0 | 0 |
| 400 | 25 | 0 | 0 | 0 |
| 500 | 31 | 5 | 0 | 0 |

A TABLE of *Excise* for Common
Brewers in the Country; at 4*s.* 9*d.* per
Barrel for Strong, and 1*s.* 3*d.* for Small.
Their Allowance being 2½ in every 23 Bar-
rels of each.

Strong Beer or Ale.

| Bar. | l. | s. | d. | f. | ths |
|--------|-----|----|----|----|-----|
| 1 Fir. | 0 | 1 | 0 | 2 | 8 |
| 2 Fir. | 0 | 2 | 1 | 1 | 6 |
| 3 Fir. | 0 | 3 | 2 | 0 | 4 |
| 1 | 0 | 4 | 2 | 3 | 2 |
| 2 | 0 | 8 | 5 | 2 | 4 |
| 5 | 0 | 12 | 8 | 1 | 7 |
| 4 | 0 | 16 | 11 | 0 | 9 |
| 5 | 1 | 1 | 2 | 0 | 1 |
| 6 | 1 | 5 | 4 | 3 | 3 |
| 7 | 1 | 9 | 7 | 2 | 5 |
| 8 | 1 | 13 | 10 | 1 | 7 |
| 9 | 1 | 18 | 1 | 0 | 9 |
| 10 | 2 | 2 | 4 | 0 | 1 |
| 20 | 4 | 4 | 8 | 0 | 3 |
| 30 | 6 | 7 | 0 | 0 | 5 |
| 40 | 8 | 9 | 4 | 0 | 7 |
| 50 | 10 | 11 | 8 | 0 | 9 |
| 60 | 12 | 14 | 0 | 1 | 0 |
| 70 | 14 | 16 | 4 | 1 | 2 |
| 80 | 16 | 18 | 8 | 1 | 4 |
| 90 | 19 | 1 | 0 | 1 | 6 |
| 100 | 21 | 3 | 4 | 1 | 7 |
| 200 | 42 | 6 | 8 | 3 | 4 |
| 300 | 63 | 10 | 1 | 1 | 1 |
| 400 | 84 | 13 | 5 | 2 | 8 |
| 500 | 105 | 16 | 10 | 0 | 6 |

Small Beer or Ale.

| Bar. | l. | s. | d. | f. | ths |
|--------|----|----|----|----|-----|
| 1 Fir. | 0 | 0 | 3 | 1 | 4 |
| 2 Fir. | 0 | 0 | 6 | 2 | 7 |
| 3 Fir. | 0 | 0 | 10 | 0 | 1 |
| 1 | 0 | 1 | 1 | 1 | 5 |
| 2 | 0 | 2 | 2 | 3 | 0 |
| 3 | 0 | 3 | 4 | 0 | 4 |
| 4 | 0 | 4 | 5 | 1 | 9 |
| 5 | 0 | 5 | 6 | 3 | 4 |
| 6 | 0 | 6 | 8 | 0 | 9 |
| 7 | 0 | 7 | 9 | 2 | 3 |
| 8 | 0 | 8 | 10 | 3 | 8 |
| 9 | 0 | 10 | 0 | 1 | 3 |
| 10 | 0 | 11 | 1 | 2 | 8 |
| 20 | 1 | 2 | 3 | 1 | 6 |
| 30 | 1 | 13 | 5 | 0 | 3 |
| 40 | 2 | 4 | 6 | 3 | 1 |
| 50 | 2 | 15 | 8 | 1 | 9 |
| 60 | 3 | 6 | 10 | 0 | 7 |
| 70 | 3 | 17 | 11 | 3 | 8 |
| 80 | 4 | 9 | 1 | 2 | 2 |
| 90 | 5 | 0 | 3 | 1 | 0 |
| 100 | 5 | 11 | 4 | 3 | 8 |
| 200 | 11 | 2 | 9 | 3 | 5 |
| 300 | 16 | 14 | 2 | 3 | 1 |
| 400 | 22 | 5 | 7 | 3 | 3 |
| 500 | 27 | 17 | 0 | 3 | 1 |

The Practical Gauger. 47

A TABLE of Excise for Malsters at 6 d. per Bushel.
 Their Allowance being 4 Bushels in every 20 Bushels charged in wet Barley.

| Bush. | this | | | | Bush. | l. s. | |
|-------|------|----|----|----|-------|-------|----|
| | s. | d. | f. | 10 | | | |
| 1 | 0 | 4 | 3 | 2 | 30 | 0 | 12 |
| 2 | 0 | 9 | 2 | 4 | 40 | 0 | 16 |
| 3 | 1 | 2 | 1 | 6 | 50 | 1 | 0 |
| 4 | 1 | 7 | 0 | 8 | 60 | 1 | 4 |
| 5 | 2 | 0 | 0 | 0 | 70 | 1 | 8 |
| 6 | 2 | 4 | 3 | 2 | 80 | 1 | 12 |
| 7 | 2 | 9 | 2 | 4 | 90 | 1 | 16 |
| 8 | 3 | 2 | 1 | 6 | 100 | 2 | 0 |
| 9 | 3 | 7 | 0 | 8 | 200 | 4 | 0 |
| 10 | 4 | 0 | 0 | 0 | 300 | 6 | 0 |
| 11 | 4 | 4 | 3 | 2 | 400 | 8 | 0 |
| 12 | 4 | 9 | 2 | 4 | 500 | 10 | 0 |
| 13 | 5 | 2 | 1 | 6 | 600 | 12 | 0 |
| 14 | 5 | 7 | 0 | 8 | 700 | 14 | 0 |
| 15 | 6 | 0 | 0 | 0 | 800 | 16 | 0 |
| 16 | 6 | 4 | 3 | 2 | 900 | 18 | 0 |
| 17 | 6 | 9 | 2 | 4 | 1000 | 20 | 0 |
| 18 | 7 | 2 | 1 | 6 | 2000 | 40 | 0 |
| 19 | 7 | 7 | 0 | 8 | 3000 | 60 | 0 |
| 20 | 8 | 0 | 0 | 0 | 4000 | 80 | 0 |

Note, Every round Bushel with a plain and even bottom, being made 18 Inches and a half wide throughout, and 8 Inches deep; shall be esteemed a Legal Winchester-Bushel, according to the Standard in His Majesties Exchequer. By the Malt-Act 8 and 9 Gals. 3.

A Vessel being thus made will contain 2150,42 Cubical Inches.

Therefore in Gauging of Male-Cisterns, or other Vessels, 2150,42 will be a constant Divisor for finding the Area's of all right-lin'd Figures in Bushels at one Inch deep. And 2738 will be a constant Divisor for finding

the Area's of all Circular Figures in Bushels, at one Inch deep.

That is, If the Square of any Circle's Diameter, be Divided by 2738 the Quotient will be it's Area in Malt-Bushels.

The

48 The Practical Gauger.

The Use of These Tables in finding the Neat Duty of any proposed Number of Barrels, &c. is thus,

If the Number of Barrels, or Bushels proposed, can be exactly found in their respective Tables, under the proper Title; then the Neat Duty is found by Inspection only.

But when your propos'd Number cannot be found at once, then you must enter the Table several times, agreeable to the Number proposed, and add their respective Sums together, as in in the following

Example.

A Common Brewer in the Country is Charged with 436 Barrels 3 Firkins of Strong Beer or Ale. 'Tis required to find the Neat Duty thereof.

| | Barrels. | l. | s. | d. | f. | ^{ths} 10 |
|---------------------|------------------------|-------|----|----|----|-------------------|
| By the Second Table | 400, comes to | 84 | 13 | 5 | 2 | 8 |
| | 30 | 6 | 7 | 0 | 0 | 5 |
| | 6 | 1 | 5 | 4 | 3 | 3 |
| | 3 Firkins | 0 | 3 | 2 | 0 | 4 |
| <hr/> | | <hr/> | | | | |
| | 436. $\frac{3}{4}$ Sum | 92 | 9 | 0 | 3 | |

Answer, The Duty is. 92l. 9s. 0d. 3f.

This Example being well understood is sufficient, to shew the use of all the other Tables.

ADDITI-

ADDITIONS CONCERNING CASK-GAUGING.

1. **A**Lthough I have already shew'd the way to Gauge close Casks, both for Ale and Wine, by the Tables which are calculated for such Casks; as are *Spheroidal* (as most close Vessels are) yet, for variety, and to inform the *Practical Gauger*, I let him know, that close Casks, by several Gaugers, are rang'd or divided into several Denominations: As, 1. A Cask may be *Cylindriacal*. 2. *Spheroidal*, 3. *Parabolical*, 4. *Conoidal*, 5. *Conical*.

2. A close Cask, whose Staves are straight, and the Head and Bung Diameters equal, may properly be call'd a *Cylinder*, which holds more than any
D other

50 *The Practical Gauger.*

other sorts of Casks; into which form all other Casks are to be reduced, to find their Proportions and Contents; which is done, by finding their mean Diameters. So a *Cylinder*, whose Diameter is 30 $\frac{4}{5}$, and Length 42 Inches, its Content will be 108.47 Ale-Gallons.

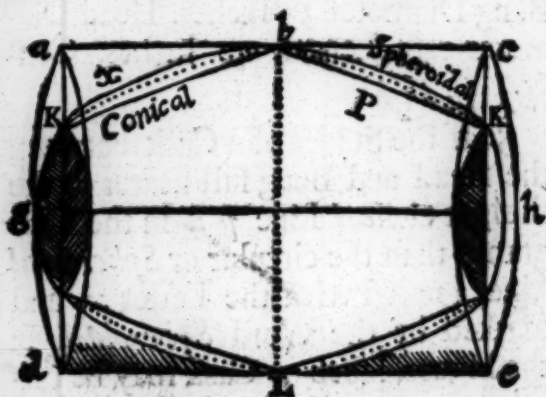
3. A Cask, whose Staves are circular, or curving from Head to Head, may be call'd a *Spheroid*, which is less than a *Cylinder*, and greater than a *Parabola*; after which form most Casks are made, and as such ought to be Gauged. So let the *Bung-Diameter* be 33 Inches, the Head 24 $\frac{5}{8}$ Inches the Length 42 Inches, the Content will be 108.45 Ale-Gallons.

3, When the Staves of a Cask between the Head and Bung come nearer to the circular or *Spheroidal* Line x , than to the streight or *Conical* Line p , in the Figure, such a Cask may be called a *Parabola*; which is less than a *Spheroid*, and greater than a *Conoid*; of which sort is the *Malaga-Butt*.
Bung-

The Practical Gauger. 51

Bung-Diameter 33 Inches, Head-Diameter 24½, Length 42 Inches, Content 104½ Ale-Gallons.

5. If the Staves of a Cask between the Head and Bung fall nearer to the straight *Conical* Line $p k$ in the Diagram, than the circular or *Spheroidal* Line, [noted with the Letter x , and marked by the Word *Spheroidal*, in the Figure,] such a Cask may be called a *Conoid*; which is less than a *Parabola*, and greater than a Cask that is *Conical*; which holds the least of all the Forms, (and is supposed to be the *Frustums* or parts of two Cones joined together) and of this form, viz. *Conoidal*, is the *Canary-Pipe*. So a Cask, whose Bung is 33 Inches, Head 24.5, and Length 42 Inches, the Content will be found [by Rules here inserted] to be 99.87 Ale-Gallons.



6. What the Gauge-Point for Wine and Ale-Gallons is, you may read in the *Appendix* of this Book: For Wine it is $17\frac{1}{2}$, for Ale or Beer $18\frac{1}{2}$; and it follows in proportion thus,

As the Square of a Circle, whose Diameter $17\frac{1}{2}$, or $18\frac{1}{2}$ is to 1, Unity; so is the Square of the Diameter of any other Circle, to a fourth Number; which being multiplied by the length of the *Cylinder*, gives the Content in Wine or Ale-Gallons.

Example.

Example.

Suppose a *Cylindrical* Cask of the Dimensions following, Length 42, Diameter at Head and Bung 30.45 Inches, the Proportions are as afore-said, viz.

As the $\left\{ \begin{array}{l} 17.15 \\ 18.95 \end{array} \right\}$ 1 :: Square 30.45 $\left\{ \begin{array}{l} 3.1534 \\ 2.5827 \end{array} \right\}$

Or thus, which is but the same thing.

As $\left\{ \begin{array}{l} 294 \\ 359 \end{array} \right\}$ to 1 :: So 927 (2025, to $\left\{ \begin{array}{l} 3.1534 \\ 2.5827 \end{array} \right\}$
As before.

Then multiply these last found Numbers by the Length 42 Inches, and the Product is the Content in Ale and Wine-Gallons.

D 3 *Example.*

54 The Practical Gauger.

Example.

| | |
|----------------|----------------|
| 3.1534 | 2.5827 |
| 42 | 42 |
| <hr/> | <hr/> |
| 63068 | 51654 |
| 126136 | 103308 |
| <hr/> | <hr/> |
| 132.4428 W. G. | 108.4724 A. G. |

7. To gauge Casks by the Line of Numbers, is touched at in another place in this Book ; but more completely as follows, by the Line of Numbers, and a pair of Compasses.

Having taken the length of the Cask, also the Diameters at the Head and Bung, first by *Subtraction* find the Difference, then multiply the Difference by .7 for a *Spheroid*, by .63 for a *Parabola*, and by .55 for a *Conoid*, (which Numbers are near the truth, though not exact,) and add the Product to the Head-Diameter for a Mean, and then extend the Compasses from

The Practical Gauger. 55

from the Gauge-point, to the Mean Diameter; the same Extent being turn'd twice forward from the Cask's Length, will fall upon the Content desir'd.

So let a *Spheroidal* Cask's Dimensions be thus :

Length 42 Inches, Head 24½, Bung
33 Inches, Mean-Diameter 33½.

As the Square,

18.95 : 42 :: 30.45 : 108.44 A. G.

That is, as the Square of 18.95, the Gauge-point, is to the Square of the Mean Diameter; so is the Length to the Content. It matters not which of the second or third Terms you put in the second place.

And then it may stand in Proportion thus,

3594 : 42 :: 927. 2025 : 108.44.

8. To Gauge a *Parabola*, this is the Rule, *viz.*

To six times the Square of the Bung-Diameter, add four times the
D 4 Square

56 *The Practical Gauger.*

Square of the Head-Diameter; then multiply a tenth part of the Summ by the Length, and divide the Product by 359 for Ale, or by 294 for Wine, [*viz.* the Square of their Gauge-points,] the Quotient will be the Content in Gallons.

Example.

Bung-Diameter 33, Head-Diameter 24.5, Length 42 Inches : Then six times the Square of 33, the Bung-Diameter, is 6534; and four times the Square of 24.5, is 2401; one tenth part of their Summ is, 893.5, which multiply'd by the Length 42, gives 37527.0; this divided by 359. Quotes 104.5, the Content in Ale-Gallons.

9. To Gauge a *Conoid*, this is the Rule :

Let the Square of the Bung-Diameter, the Square of the Head-Diameter, and the Square of half the Difference of the Diameters be added together;

The Practical Ganger. 57

together; then multiply that Summ by half the length, and divide the Product by 359, or 294, the Quotient will be the Content in Ale or Wine-Gallons.

As for Example.

Let the Dimensions be as before, the Square of 33 is 1089, the Square of 24.5 is 600.25, the Square of half the Difference of the Diameters 4.25, is 186 : The Summ of these is 1707.31; multiply'd by half the Length, viz. 21, the Product is 35853.51 : This divided by 359, the Quotient will be 99.87, the Content of Ale-Gallons; or divided by 294, the Quotient will be 121.9, in Wine-Gallons.

The following Table shews the Dimensions of Casks, with their Contents, in the three several Cases.

D 5 Lengths.

| Lengths | Diameters | | Content | Content | Content |
|---------|-----------|------|---------|---------|---------|
| | B. | H. | Spher. | Parab. | Conoid. |
| 48 | 34 | 24 | 128.69 | 123.22 | 117.68 |
| 40 | 29 | 24.5 | 86.92 | 84.91 | 82.20 |
| 36 | 31.5 | 24.5 | 86.38 | 83.76 | 80.45 |
| 34 | 26 | 20 | 55.29 | 53.55 | 51.37 |
| 30 | 28.1 | 24 | 60.00 | 58.80 | 57.20 |

More Varieties, both as to gauging of Tuns, as well as Casks, (though much more hard to be understood,) I have long since printed in my *Merchant's Companion*: But these Rules are more easie and practical, and therefore sufficient to inform any ingenious Tyro.

Four useful Problems, fit for every Gauger to understand; and which several Authors have directed, in order to the taking the Dimensions of several Casks. And these are according to my old Friend Mr. J. B's Directions.

P R O B. I.

Having the Diameter and Length, to find the Diagonal Line.

The Rule.

Add the Square of the half Summ of both the Diameters to the Square of the half Length, then the square Root of the Summ shall be the Diagonal Line requir'd. This Truth is demonstrated in the Forty seventh Proposition of the first Book of *Euclid's Elements*.

Example.

Example.

If the half Length be 20 Inches, then the Square thereof is 400; the half Summ of 32 and 24, the 2 Diameters, is 28; the Square thereof is 784: Then the 2 Squares added, make 1184; whose square Root is 34.408, the Diagonal Line requir'd.

P R O B. II.

Having the Diameter and Diagonal, to find the true Length of a Cask.

The Rule.

Subtract the Square of the half Summ of both Diameters, from the Square of the Diagonal; then the square Root of the Remainder, is the half Length required.

Example.

The Square of the Diagonal Line 34.408 is 1184; from which when
784

The Practical Gauger. 61

784 the Square of 28, the half Summ of 32. and 24 the two Diameters, is subtraſted, remains 400, whoſe ſquare Root is 20, the half Length required.

PROB. III.

Having the Depth and Diameters of an open Conical Veſſel, to find the Length of the Leaning Side or Slant, Height or Depth.

The Rule.

To the Square of the Depth, add the Square of half the Difference of the Diameters; then the ſquare Root of that Summ ſhall be the Length of the Slope-Line, or Length of the Leaning Side.

Example.

Let the Perpendicular Depth be 20, the difference of the Diameters 8; then the Square of 20, viz. 400, and the Square of 4, the half of 8, viz. 16, added, is 416; whoſe ſquare Root is 20.396, the Slant, Height, or Depth required.

PROB.

P R O B. IV.

*Having the Diagonal, the Depth and
slant Height, to find the Diameters.*

The Rule.

1. From the Square of the Diagonal, subtract the Square of the Depth; the square Root of the Remainder is the half Summ of the Diameters.

2. From the Square of the slant Depth, subtract the Square of the perpendicular Depth; then the square Root of the Remainder is the half difference of the Diameters; which being added to the half Summ of the Diameters, gives the greater Diameter; and subtracted from the half Summ of the Diameters, leaves the lesser of the Diameters.

Example I.

When 400 the Square of 20, the Depth is taken from 1184, the Square of 34.408 the Diagonal, the Remainder

The Practical Gauger. 63

der is 784, the Square of 28, the half Summ of the two Diameters, by extracting the square Root.

Example. II.

The Square of the perpendicular Depth 20. *viz.* 400, taken from the Square of 20.396, *viz.* 416, the flant Depth, remains 16, the square of 4; which added to 28, the half Summ of the Diameters, gives 32, the greater Diameter; or being taken from 28, rests 24; the lesser Diameter requir'd.

These four Problems are of excellent use for a *Gauger*, many times, in taking the Dimensions of Casks, either close or open; and have been taught by many Authors; as Mr. *John Smith*, Mr. *William Hunt*, and particularly by Mr. *Michael Dary*, but hitherto omitted in this small Piece; but now, to make it the more compleat, this, and divers other useful Matters are added, which were not in the former Editions of this *Pocket-Companion*. Ob-

64 *The Practical Gauger.*

*Observations of Gauging in the
Port of London.*

Allowed for the thickness of the
Head, Pipes and Puncheons, one Inch.

Hogheads $\frac{7}{8}$, or $\frac{3}{4}$ of an Inch;
and $\frac{1}{2}$, or $\frac{1}{4}$ an Inch is allowed for the
thickness of the Staves.

And in Pipes and Puncheons $\frac{3}{4}$,
Hogheads $\frac{1}{2}$ an Inch, or $\frac{1}{4}$.

Casks commonly bored.

| | | |
|---------|---|---------|
| Rochel | } | Pieces. |
| Nantz | | |
| Sherant | | |

Bordeaux Pieces, which generally
hold from 90, to 130 Gallons, are
commonly made without deceit.

A
TABLE
OF
AREAS of SEGMENTS
OF A
CIRCLE,

Whose whole *Area* is 2, and the
Radius divided into 100 pts.

CALCULATED

To the $\frac{1}{10000}$ part of a square Inch.

Areas of Segments.

| V. Area | V. Area | V. Area | V. Area |
|---------|---------|---------|---------|
| 1.0017 | 99.9983 | 26.2066 | 74.7934 |
| 2.0048 | 98.9952 | 27.2178 | 73.7822 |
| 3.0087 | 97.9913 | 28.2292 | 72.7708 |
| 4.0134 | 96.9866 | 29.2407 | 71.7593 |
| 5.0187 | 95.9813 | 30.2523 | 70.7477 |
| 6.0245 | 94.9755 | 31.2644 | 69.7360 |
| 7.0308 | 93.9692 | 32.2759 | 68.7241 |
| 8.0375 | 92.9625 | 33.2878 | 67.7122 |
| 9.0446 | 91.9554 | 34.2998 | 66.7002 |
| 10.0520 | 90.9480 | 35.3119 | 65.6881 |
| 11.0598 | 89.9402 | 36.3241 | 64.6759 |
| 12.0680 | 88.9320 | 37.3364 | 63.6639 |
| 13.0764 | 87.9236 | 38.3487 | 62.6513 |
| 14.0851 | 86.9149 | 39.3611 | 61.6389 |
| 15.0941 | 85.9059 | 40.3735 | 60.6265 |
| 16.1033 | 84.8967 | 41.3860 | 59.6140 |
| 17.1127 | 83.8873 | 42.3986 | 58.6014 |
| 18.1224 | 82.8776 | 43.4112 | 57.5888 |
| 19.1323 | 81.8677 | 44.4238 | 56.5762 |
| 20.1424 | 80.8576 | 45.4364 | 55.5636 |
| 21.1527 | 79.8473 | 46.4491 | 54.5509 |
| 22.1631 | 78.8369 | 47.4618 | 53.5382 |
| 23.1737 | 77.8263 | 48.4745 | 52.5255 |
| 24.1845 | 76.8155 | 49.4873 | 51.5127 |
| 25.1955 | 75.8045 | 50.5000 | 50.5000 |

The Practical Gauger. 67

The use of the precedent Table is very considerable in *Geometry*, but my present intention is, to apply it to *Cask-Gauging*, viz. To find the vacant Frustums in a Cask partly full, lying with its Axis parallel to the Horizon; the Cask being taken as the Frustum of a Spheroid, cut with two Planes parallel, bisecting the Axis at Right Angles.

And here it is requisite, the Bung and Head-Diameters, Cask's Length, the whole Content, and dry or wet Inches be known. Then, if the Question be, what is wanting, or what is remaining in the Cask; divide either the dry or wet Inches by the Bung-Diameter, and the Quote seek in the Table, under V or *Versed Sine*; against it stands a Number, which multiply'd by the Content, exhibits the Vacuity, if your Dividend were the dry, or the remaining Liquor if it were the wet Inches.

Some

*Some Examples of the Use of the
Table of Areas of Segments, in
finding the Vacuity of a Cask.*

QUEST. I.

*What is the Ullage of the Cask, whose
Bung-Diameter is 28 Inches, Con-
tent 60 Gallons, and dry Inches 7?*

According to the precedent Rule, I
divide 7 by 28, which I do by adding
two Cyphers; thus:

$$\begin{array}{r} 28 \overline{) 7.00} \quad (25 \\ \underline{140} \\ 0 \end{array}$$

Then seeking 25 in the Table, in
the Column under V, in the next Co-
lumn against it, I find .1955; which
Number I multiply by the whole Con-
tent, and cutting off four places to-
ward the Right Hand of the Product,
it

The Practical Ganger. 89

it exhibits the Ullage, or Wants, in that Cask, in Gallons and Parts.

Example.

| | |
|----------------|---------|
| Tabular Number | .1955 |
| Content | 60 |
| <hr/> | |
| | 11.7300 |

So is the Ullage, or Wants, 11 Gallons, and almost $\frac{3}{4}$ of a Gallon.

QUEST. II.

What quantity of Liquor is there remaining in this Cask?

Divide the wet Inches by the Bung-Diameter, after this manner:

| | | |
|-----|-------|-----|
| 28) | 2100 | (75 |
| | 140 | |
| | <hr/> | |
| | 0 | |

Against which Number (75) I find
in

70 *The Practical Gauger:*

in the Table .8045, which I multiply by the whole Content, as before; and the Product gives the Quantity of remaining Liquor.

Example.

| | |
|---------------|-------|
| Tabula Number | .8045 |
| Content | 60 |

| | |
|------------------|---------|
| Remaining Liquor | 48.2700 |
| Wants | 11.7300 |

Proof 60.0000

Now, if after Division, there happen a Remainder, and that be above half the Divisor, I take the next bigger Number; or if it be less than half the Divisor, I take the next lesser Number, as in the following Examples.

QUEST.

QUEST. III.

*If in the forementioned Cask there be
9 Inches of the Bung-Diameter dry,
what is the Wants?*

$$\begin{array}{r} 28) 9.00 \quad (32 \\ \quad 60 \\ \hline \quad \quad 4 \end{array}$$

Here the Remainder being under
half the Divisor, I take 32,

Whose *Area* is .2759

Which I mult. by the whole Cont. 60

The Ullage, or Wants 16.5540

QUEST. IV.

*There being 19 wet Inches, what are
the remaining Gallons?*

$$\begin{array}{r} 28) 1900 \quad (67 \\ \quad 220 \\ \hline \quad \quad 24 \end{array}$$

Here


72 *The Practical Gauger.*

Here the Remainder being above half the Divisor, I take the next bigger Number, *viz.* 68,

Whose *Area* is .7241
Whose *Content* 60

Quantity remaining 43.4460
To which add the Ullage 16.5540

· Makes 60.0000
prout supra.

 *Note*, That the proportion of the Table, *pag.* 68. is thus, *viz.*

1. As the Bung-Diameter is to 1.00, so the dry or wet Inches to a *Fourth Number*; which is the *Versed Sine* of the *Segment* of a Circle, whose *Area* you may find in the Table.

2. As 1.0000 is to the Cask's whole Content; so is that *Area* found in the Table, to the Wants, or remaining Liquor found in the Cask;

THE

THE
Description and Use
OF THE
GAUGING-RULE,

THIS Rule is commonly four Foot in length, and is made to double in four Joints, for convenient portage: It has also four Sides, on which are drawn several Lines, *viz.*

1. There are two Lines call'd *Diagonals*; the one for Wine, the other for Beer or Ale-Measure. These are so commonly known, that I suppose there are few Officers, but are well acquainted with them; however, lest any should be ignorant, take this following Advice.

74 *The Practical Ganger.*

Put the end which is cut slope-ways in at the Bung-hole, and let it touch the bottom of the Head, the Number that appears at the Bung is the Number of Ale or Wine-Gallons respectively.

Example.



a b c d a Cask

Put your Rule down at the Bung-hole *e*, to the bottom of the Head *e*; if 60 appear at the Bung on the Diagonal for Wine, then is the Content 60 Wine-Gallons, and almost 49 Ale-Gallons; for the Sub-divisions between the Numbers, from 10 upwards, signifie each one Gallon.

This way will give a very good Estimate of the Content of all Casks in the form of the *London-Beer-Barrel*,
or

or the *Branch Wine Hogshead*. These Lines being together, serve also very well for a Table of Reduction of Wine into Ale-Measure, and the Converse by inspection only.

2. On another Side or Face there is put a Line of Inches, from 1 to 48 Inches, and each Decimally divided; and also upon the same Side you have *Oughtred's Gauge-Line*, it being a Line of one thirds of *Areas of Circles* in *Wine-Gallons*, by which you may Gauge a Cask after this manner:

Put your Rule down at the Bung perpendicularly, observing what Numbers appears just even with the inside or the Cask; admit it be 7, set that down twice, then take the Diameter at the Head, and let that shew you 6 upon the same Line; set that down to the former, add these three Numbers together, and multiply the Summ by the Cask's length, here 30; then cut off one place from the Product toward the Right-Hand, and the Figures toward the Left-Hand

E 2

are

76 The Practical Gauger.

are your Number of Wine-Gallons
contained in the Cask.

Example.

7
7
6
—
20

Cask's Length = 30

Cask's Content = 60.0 Wine-Gallons.

Note, If your Diameter fall amongst
the Divisions, between the Numbers,
you must cut off two places from the
Product.

Example.

Bung-Diameter 71

Head-Diameter 58

200

Cask's Length 30

Content as before 60.00 Wine-Gall.

3. On

3. On a third Face of this Rule (which meets the precedent Line of One thirds of *Areas* upon one Angle or Edge of the Rule) is put a Line of equal parts, numbred from 1 to 96, and is divided into halves: This Line considered, together with that before-mentioned, do make a Table of *Areas* of Circles in Ale-Gallons; so that if you find your Diameter in this Line, turn up the other Face, and against your Diameter you shall have the *Area* of your Circle in Ale-measure.

As for Example.

The Diameter of a Circle is 19 Inches; the *Area* of that Circle, upon the other Edge in *Oughtred's* Line, is a little above one Gallon.

Again, The Diameter being 30 Inches, the *Area* is 2.5 Gallons; and if the Diameter be 67 Inches, it holds 12.5 Gallons upon one Inch of depth.

The use of these Lines, thus together,

78 *The Practical Gauger.*

ther, is the same with that of the Table of *Areas*, pag. 29, &c.

4. On the fourth Side of this Rule is drawn a Line of Numbers, vulgarly call'd *Gunter's Line*; which Line, with a pair of Compasses is of excellent use upon sundry occasions, it being a Line of Logarithms; and by it is performed Multiplication, Division, Extraction of the Square and Cube-Roots, and many other Calculations Arithmetical. Of this Line alone are two or three Books of like magnitude with this, already Printed, to which, for those things I refer you, and shall here only apply it to Cask-Gauging; of which, take the following Instructions.

First learn to find any Number upon the Line, from 1 to 10 you have the Figures Arithmetically plac'd, and the Sub-divisions are Tenths; but from 10 to 20, the Divisions signifie each an additional Unite, and so to 100.

At 17.2 you have a small Brass-pin, whereon to set the Foot of your Compasses,

The Practical Gauger. 79

passes, and is call'd the Gauge-point for Wine-Gallons, almost at 19 is the Gauge-point for Ale-Gallons; the first hath *w.g.*, and the other *a.g.* placed over it, by which they are easily known.

To Gauge a Cask by this Line, you must first find the Diameter at the Head and Bung, and also the Cask's Length, by the Line of Inches: These being had, find your Mean Diameter, by adding double the Bung-Diameter to once the Diameter at the Head, and divide their Summ by 3, the Quote take for your Mean; then with your Compasses set one Foot in the Gauge-point, and extend the other to the Mean Diameter upon your Line of Numbers; so keeping your Points at that distance, set one Foot at the Number expressing the Cask's Length, and from thence double the distance of the Feet of the Compasses exhibits the Content in Ale or Wine-Gallons respectively.

As for Example.

A Cask, Bung-Diameter 27, Head 24, Length 30 Inches; if the Content be required in Ale or Wine-Gallons, I find the Mean-Diameter according to the Rule, thus:

$$\begin{array}{r}
 27 \\
 27 \\
 24 \\
 \hline
 3) 78 \quad (26 \\
 18 \\
 \hline
 0
 \end{array}$$

The Mean-Diameter being 26, I take my Rule and Compasses, if the Question be Ale-Gallons, and set one Foot in the Gauge-point for Ale, and the other I extend to 26; then I take off the Compasses so extended, and setting one Foot at 30, the Length, giving the Compasses one turn upon the

The Practical Gauger. 81

the other Foot, whereby to take the double distance, and the Point touches at 57, which is the Content of that Cask in Ale-Gallons.

If the Question be Wine-Gallons, I take the distance from the Gauge-point for Wine to 26 the Mean-Diameter, and the Compasses apply'd to the Cask's Length, and turn'd as before, exhibit 69, the Content of the Cask in Wine-Gallons.

This is a very quick and easie way of Gauging Casks, and is also an Approximation near enough the Truth for common practice.

Having the Mean-Diameter of any Conical Tun, and the Depth of Liquor, the Quantity is found after the same manner.

Example.

The Mean-Diameter of a Tun 28, depth of Liquor 29, the quantity of Ale-Gallons will be found $63 \frac{1}{2}$.

E 5

The

The common way of finding the Mean-Diameter of a Conical Tun is, by adding the Diameters above and below together, and take the half. This I allow, as an easie and practical way for young Gaugers : But Note, That the greater the difference of the Diameters are, the greater is your Error; but in Diameters that differ not much, it doth very well.

There is also another Line that runs parallel with this Line of Numbers, and is call'd *A Line of Segments*; but I like not the *Hypothesis*, upon which it is framed : And the way of finding the Wants of a Cask (lying with its *Axis* parallel to the Horizon, being partly empty of Liquor) is made so plain and easie by the precedent Examples upon the Tables of *Areas of Segments*, I had thought to have left it out; but lest any having a Rule, and not a Table by him, should have such occasion, let him take one.

Example.

Example.

A Cask's Bung 24 Inches, wet 18 Inches, Content 50 Ale-Gallons, what is the Ullage or Wants in this Cask?

As 24 on the Line of Numbers is to *Radius* on the Segments, so is 6 on the Numbers to 17.8 on the Segments.

Then, As Unity to 60 on the Numbers, so 17.8 on the Numbers to 8.9 Ale-Gallons; the Wants required.

A Table

A Table of Beer-Measure.

| The Names of Beer-Vessels | Cubical Inches | Pints | Quarts | Gallons | Firkins | Kilderkins | Barrels |
|---------------------------|------------------|-------|--------|---------|---------|------------|---------|
| 1 Barrel | 10152 | 288 | 144 | 36 | 4 | 2 | 1 |
| 1 Kilderkin | 5076 | 144 | 72 | 18 | 2 | 1 | |
| 1 Firkin | 2538 | 72 | 36 | 9 | 1 | | |
| 1 Gallon | 282 | 8 | 4 | 1 | | | |
| 1 Quart | 70 $\frac{1}{2}$ | 2 | 1 | | | | |
| 1 Pint | 35 $\frac{1}{4}$ | 1 | | | | | |
| 1 Cubical Inch. | 1 | | | | | | |

A Table of Ale-Measure.

| The Names of Ale-Vessels | Cubical Inches | Pints | Quarts | Gallons | Fir-kins | Kilder-kins | Barrels |
|--------------------------|----------------|-------|--------|---------|----------|-------------|---------|
| 1 Barrel | 9024 | 256 | 128 | 32 | 4 | 2 | 1 |
| 1 Kilderkin | 4512 | 128 | 64 | 16 | 2 | 1 | |
| 1 Firkin | 2256 | 64 | 32 | 8 | 1 | | |
| 1 Gallon | 282 | 8 | 4 | 1 | | | |
| 1 Quart | 70½ | 2 | 1 | | | | |
| 1 Pint | 35¼ | 1 | | | | | |
| 1 Cubical Inch. | 1 | | | | | | |

A Table of Wine-Measure.

| The Names of Cubical Wine-Vessels | Inches | Pints | Quarts | Gal- lons | Kun- lets | Hogs- heads | Ter- cions | Pipes or Butts | Tuns |
|-----------------------------------|--------|-------|--------|--------------|--------------|----------------|---------------|-------------------|------|
| 1 Tun | 58212 | 2016 | 1008 | 252 | 14 | 4 | 3 | 2 | 1 |
| 1 Pipe or But | 29106 | 1008 | 504 | 126 | 7 | 2 | 1½ | 1 | |
| 1 Tiercion | 19404 | 672 | 335 | 84 | 4½ | 1½ | 1 | | |
| 1 Hogshhead | 14553 | 504 | 252 | 63 | 3½ | 1 | | | |
| 1 Kunlet | 4158 | 144 | 72 | 18 | 1 | | | | |
| 1 Gallon | 231 | 8 | 4 | 1 | | | | | |
| 1 Quart | 57½ | 2 | 1 | | | | | | |
| 1 Pint | 28½ | 1 | | | | | | | |
| 1 Cubical Inch | 1 | | | | | | | | |

A NECESSARY
APPENDIX
TO THE
Practical GAUGER

1. Of Decimal Fractions.

A Decimal Fraction is that, whose Denominator is an Unite, with Cyphers annexed, thus; as, 10, 100, 1000, 10000, &c. and the Numerator and Denominator usually expressed thus, viz. $\frac{3}{10}$, $\frac{367}{1000}$, $\frac{707}{1000}$, $\frac{7032}{10000}$ but are usually written without their Denominators thus, with a Point, Period, or Comma before them, thus, .3 .15 .376 .07 .032.

2. In

88 *The Practicall Gauger.*

2. *In Addition of Decimals, this is the Rule.*

The places of the same Denomination, being set one under another, are to be added as in common Arithmetick.

As for Example.

Inches, Feet, Pounds, &c.
with Decimal parts.

| | | |
|--------------------|--------------|-----------------|
| 92.3 | 72.36 | 976.356 |
| 42.2 | 57.81 | 352.179 |
| 37.1 | 39.26 | 976.219 |
| 62.5 | 87.61 | 319.592 |
| 38.1 | 39.25 | 862.613 |
| 52.9 | 81.29 | 281.902 |
| <u>Summ</u> 325.1 | <u>21.62</u> | <u>596.971</u> |
| <u>Summ</u> 399.20 | | <u>620.396</u> |
| | <u>Total</u> | <u>4986.228</u> |

3. *In Subtraction of Decimals, this is the Rule.*

The places of the same Denomination, being set one under another, are to

The Practical Gauger. 89

to be subtracted as in common Arithmetick..

Example.

| | | | |
|-------|--------------|----------------|----------------|
| From | 92.3 | 62.2 | 57.62 |
| Subt. | <u>59.6</u> | <u>57.6</u> | <u>39.76</u> |
| Rem. | <u>32.7</u> | <u>04.6</u> | <u>17.86</u> |
| From | 96.27 | 936.512 | 736.627 |
| Subt. | <u>35.35</u> | <u>372.693</u> | <u>562.978</u> |
| Rem. | <u>60.92</u> | <u>563.819</u> | <u>173.649</u> |

4. In Multiplication of Decimals, this is the Rule.

Multiply as in whole Numbers, and from the Product cut off and distinguish so many Figures towards the Right Hand, with a Point or Comma, as there are Parts or Decimal Fractions in both Multiplicand and Multiplier ; as in these Examples.

| | | | |
|-----|---------------|----------------|-----|
| (1) | 37.9 | 59.63 | (2) |
| | <u>5.2</u> | <u>52</u> | |
| | 758 | 11926 | |
| | 1895 | 29815 | |
| | <u>197.08</u> | <u>3100.76</u> | |

925.6

90 *The Practical Ganger.*

925.6 (3)

.072

18512

64792

66.6432

72.352 (4)

.009

.651168

.097 (5)

.006

.000582

(6) 356.92 Multiplicand.

37.92 Multiplier.

71384

321228

249844

107076

13534.4064 Product.

Where Note, that in the first Example there are only two Decimal parts in the Multiplicand and Multiplier, and therefore only two parts are cut off, or separated towards the Right-Hand in the Product; the same in the Second Example. In the Third Example there is four Decimal parts cut off, in the Fourth Example six, in the Fifth six parts are cut off likewise, and lastly, in the sixth there are four cut

cut off, which is the Numerator of a Fraction whose Denominator is four Cyphers, and an Unite, to the Left-Hand, thus, $1\frac{4}{10000}$, viz. almost a half; understand the same in the rest.

5. *In Division of Decimals, this is the Rule.*

Here lies all the Difficulty, care must be taken to give a true Denomination to the first Figure of the Quotient, after the Division is made, (which is no more than Division in whole Numbers) and the Rule is this:

Having made the Division as in whole Numbers, then you are to observe the first Figure of the Quotient which is always of the same Denomination with that Figure of the Dividend, which stands (or is suppos'd to stand, by supplying of Cyphers) over the Unites place of the Divisor, being orderly placed under the Dividend; or, which is the same thing, there must be so many parts cut off, or separated in the Quotient by a Point, that will make those in the Divisor (if any be) equal

92 *The Practical Gauger.*

equal to the Number of Decimal parts in the Dividend, which will be easily understood by these following Examples.

| Divisor | Dividend | Quotient |
|---------|------------|----------|
| 28.75) | 1524.25000 | (53.071 |

Where Note, That there are five Decimal parts in the Dividend, and only two in the Divisor; therefore I cut off three Figures in the Quotient by a Point, to make those parts in the Divisor equal to those in the Dividend, according to the Rule: Or, if the Divisor was placed orderly under the Dividend, the Unites place (8) in the Divisor, would stand right under the Tens place in the Dividend, and therefore the first Figure in the Quotient must be of the same Denomination, viz. Tens, Ergo 53.1000.

17)53.672(3.157 | 44)35.673(.810

2.63)1.0000(.38 | .32) 6880(2.15

.032) 1935000 (604.68

.25)2481.00(9924 | 33).4375 (.0122

Thus

The Practical Gauger. 93

Thus by these Examples, the former Rule is illustrated and made plain to an ordinary Capacity; without a competent knowledge hereof, no Man may hope to be an expert Gauger, and must therefore be very perfect herein, before he enters upon either the Theory or Practick part.

In the next place, I shall present the Reader with some few necessary proportions to exercise Decimal Arithmetick, and they are also very useful in the Business of Gauging.

1. As 1 is to 3.1415927; so is the Diameter to the Circumference of a Circle, whose Diameter is 1, or Unity, with Cyphers: And thus if the Diameter of any Circle be multiply'd by the aforesaid Number, cutting off Seven Figures, you have the Circumference in whole Numbers, and Decimal Parts, in the same Measure by which the Diameter was taken; for if the Diameter be 10000, &c. the Circumference is 3.14159, &c.

2. Having the Circumference of a
Circle

94 *The Practical Gauger.*

Circle to find the Diameter Multiply the Circumference of the Circle by this Decimal Number .31831 [which is only the Quotient of 1 with Cyphers, divided by the aforesaid Number 3.14159, &c.

3. The Area of a Circle given, to find the Circumference. Multiply the Area by 12.5664. [viz. the Square of the Circumference of a Circle, whose Area is Unity, or 1 with Cyphers.]

4. The Circumference of a Circle given, to find the Area. Multiply the Square of the Circumference by .079578, the Product is the Area; for as the Square of the Circumference of one Circle is to the Superficial Content thereof, so is the Square of the Circumference of another to the Superficial Content requir'd; and thus you may say, As the Square of the Circumference 3.14159, is to the Content thereof 7853938, so is 1 to the Square of another Circle to 0.079578 the Content.

5. The

The Practical Gauger. 95

5. The Superficial Content given, to find the Diameter. Multiply the Square Inches of the *Area* given by this Number 1.27324, [that is the Square of the Diameter of a Circle whose *Area* is Unity with Cyphers.]

And here Note, that there be several other fitted Decimal Numbers used in the Art of Gauging by some Authors not explain'd, as .004533325 is a Multiplier for Wine-Gallons in Globular Measure, and .0035461 is a Multiplier for Ale-Gallons, which is only the Natural Number proper to the Complement Arithmetical of the Logarithm of 282, the Cube Inches in a Beer or Ale-Gallon; the same is to be understood in the first of these Numbers for Wine-Gallons, 1.73205 is the Square Root of 3, and so this Number 1.27324 is the Square of the Diameter of a Circle whose Diameter is 1 with Cyphers. The Gauge-point (which is of good use in Gauging, as all Practical Gaugers well know) for Circular Measure for Ale is 18.95; for if you con-

conceive a Circle, inch deep, to contain in *Area* 282.25, the Diameter thereof will be 18.95. By the same reason, the Gauge-Point for a round Wine-Gallon is 17.15. But of the Square Ale-Gallon, the Gauge-point or side of that Square is but 16.8, and of a Square Wine-Gallon 15.2. *Note* also that 359 is the Square of the Gauge-point for Ale at 282 +, and 294 is the Square of the Gauge-point for Wine, at 231 Cubical Inches to the Gallon. The Gauge-point for a Globous Vessel is 23.2 for Ale, and for Wine 21. So the Square of the Gauge-point for a Globular Vessel for Ale is 540; and for Wine 440; 1077 is Triple the Square of the Gauge-point for the Ale-Gallon, and 880 is Triple the Square of the Gauge-point for the Wine-Gallon. The Gauge-point for a Cone for Barrels is 169.9, and the Gauge-point for a Cone for Gallons is 32.28; 38772 is Triple the Square of the Gauge-point for the Ale-Barrel. These are Numbers of very good use, and fit to

The Practical Gauger. 97

to be known by all Practical Gaugers, as well as their Surveyors. And here I shall add some few Examples ready wrought for the Exercise of the young Tyro, and his Decimal Arithmetick, applicable still to Gauging. (1.) If the Diameter of a Circle be 42 Inches, the Circumference thereof will be found to be 131.9472, by the Rule before given. (2) If the Diameter of a Circle be 42, the *Area* must be 1385.382072, (3) In the same Circle the side of the Square inscrib'd is 29.698494. (4) The side of a Square equal 37.2204, and so by the Rule before given, if the Circumference be known to be 131.95, the Diameter will be found 42, to prove the Work; and the same Circumference being given, the *Area* will be found 1385.5168+ as before, the Difference inconsiderable. Again, if you multiply the longest Diameter of an Ellipsis, suppose 48 Inches, by the shortest Diameter, which suppose 32 Inches; the Product is 1736, whose Square

F Root

98 *The Practical Gauger.*

Root is 14. 15, a Geometrical mean, and thus the Ellipse is reduced into a Circle, whose Diameter is 14 Inches 15 Parts, and may now be measur'd in all Respects, as in finding the *Area* of a Circle.

Rules how to Calculate the Areas of Circles in Ale or Wine-Gallons: The Ale-Gallon being 282, and the Wine 231 Cubical Inches; a different way from what is before taught.

The Square of any Diameter in Inches, divided by 883, is the Construction of the Wine-Table, or by 1077 is the Construction of the Beer-Table, according to *Michael Dary*; and either of these Tables have their second Differences equal, and may therefore be made by an easie Collection. But the Construction of those Tables are much more intelligible to some thus: (1) Divide an Unite or 1 with Cyphers by 282, (the Cubical Inches in an Ale-Gallon) and multiply the
the

The Practical Gauger. 99

the Quotient by 78539, (*viz.* the *Area* of a Circle whose Diameter is Unity,) the Product is .0027851+ a constant Multiplier; by which if you multiply the Square of any Diameter, the Product is the Circle's *Area*, correspondent in Ale-Gallons. (2) Divide an Unite or 1 with Cyphers by 231 [the Cubical Inches in a Wine-Gallon] and then multiply the Quotient by .78539, the Product .0034+ is a constant Multiplier; by which if you Multiply the Square of any Diameter, the Product is the Circle's *Area*, correspondent in Wine-Gallons: Or you may divide the Square of the Diameter by 359 (as in the Example, after the Tables themselves) the true Number is 359,0536 for Ale-Gallons, or by 294,1184 for Wine Gallons; the Quotient is the Circle's *Area*, (according to the Divisor taken) and these Divisors are found, by multiplying 282 and 231 severally by 1.27324+ [the Square of the Diameter of a Circle whose *Area* is Uni-

100 *The Practical Ganger.*

ty.] And now seeing either of these Tables have their second Differences equal, they may more easily be made by Interpolation, after the following method; for to calculate it after the manner aforesaid gradually would be very Tedious.

| A Table of <i>Area's</i> of Circles for Wine-Gallons. | | | | |
|--|-------------|--------------------------|----------------|----------------|
| <i>Inch.</i> | <i>Dia.</i> | <i>Circles Area.</i> | <i>1 Diff.</i> | <i>2 Diff.</i> |
| 1 | | 0.0034 | | |
| 2 | | 0.0136 | .102 | .68 |
| 3 | | 0.0306 | .170 | .68 |
| 4 | | 0.0544 | .238 | .68 |
| 5 | | 0.0850 | .306 | .68 |
| 6 | | 0.1224 | .374 | .68 |
| 7 | | 0.1666 | .442 | .68 |
| 8 | | 0.2176 | .510 | .68 |
| 9 | | 0.2754 | .578 | .68 |
| 10 | | 0.3400 | .646 | .68 |

How

The Practical Gauger. 101

How these Tables are made by a Gradual Collection and Addition of the first and second Differences.

A plain Example.

In Di. 10 = 0.3400

646 1 Difference
68 2 Difference

In Di. 11 = 0.4114

646 1 Diff.
68 } 2 Diff.
68 }

12 = 0.4896

646 1 Diff.
204 2 Diff. Tripled.

13 = 0.5746

646 Area
272

14 = 0.6664

Area

And thus after you have Calculated to the first ten Inches Diameter, and

F 3

taken

102 *The Practical Gauger.*

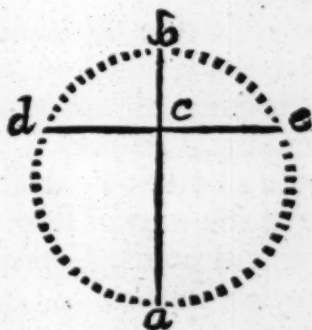
taken the first and second Differences you may by Interpolation proceed as far as you please, but 'tis convenient to examine the Work at every one or ten Inches; and thus the business is made plain to the meanest Capacity.

Let the *Practical Gauger* farther observe in Solids, that a *Cube* is double the *Prisme*, and triple the square *Pyramid* of equal Base and Altitude; or in proportion, as 3, 2, and 1.

Farther Note, that a *Cone* is $\frac{1}{3}$ of a *Cylinder* and a *Sphere* is $\frac{2}{3}$ parts of a *Cylinder*; or 2 *Cones* are equal to a *Sphere*, and 3 *Cones* equal to a *Cylinder* of the same Base and Altitude, as 1, 2, and 3. Also a *Cylinder* $\frac{1}{4}$ of a *Cube*, and a *Sphere* is $\frac{1}{2}$ of a *Cube*, or $\frac{2}{3}$ of a *Cylinder*, &c. as all Geometrical Authors demonstrate.

This

This Problem is of good use in finding
the solidity or content of the rising
Crown of a Brewer's Copper.



Having the Altitude of the greater
and lesser *Frustum* of a *Globe*; viz.
 ca 24 Inches, & c , and the lesser bc 6.
also the Diameter of the Base de 24
Inches, to find the Content of the
lesser *Frustum* $dbec$.

The Rule.

1. By the Diameter of the *Frustum's*
Base, find the Area of a Circle equal
there.

F. 4

104 *The Practical Gauger.*

thereunto, thus, [*as 14 to 11. So the Square of the Diameter to the Area.*

2. Multiply this *Area* by 6, the lesser *Frustum's* Altitude, and reserve the Product.

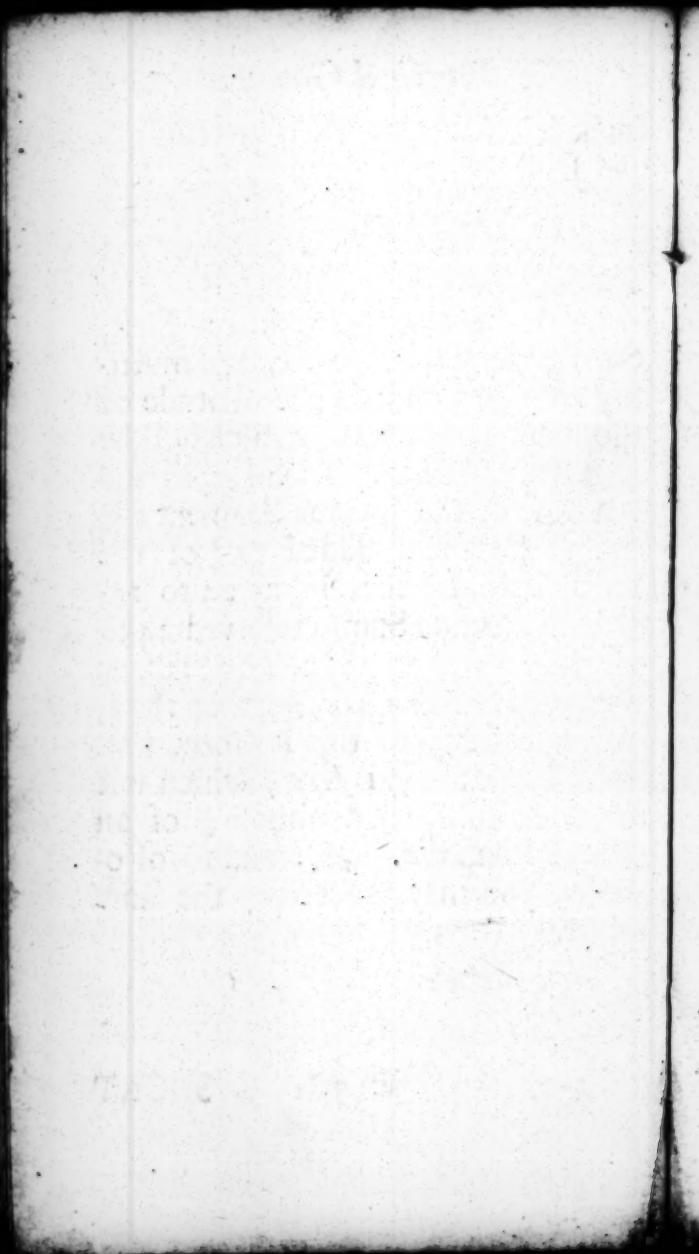
3. To Half the Altitude of the greatest *Frustum*, add $\frac{1}{6}$ of the Altitude of the lesser; this done, multiply the Summ by the reserved Product, and divide this last Product by the Altitude of the greater *Frustum*; the Quotient will be the Content of the lesser *Frustum* sought.

Example.

The *Area* of the Circle whose Diameter is 24. is 1, 6042 Gallons, this multiplied by *e b*, 6 is 9.6252. which I reserve; then $\frac{1}{2}$ *a c* is = 12. to which add $\frac{1}{6}$ of *c b*, viz- 1. the Summ is 13: This multiplied by 9.6252. the Product is 125.1276. and this divided by *a c*, 24 Quotes 5.2132. the Content of the *Frustum* in Ale-Gallons. The *Area* of the Circle in Inches, is near 453 square Inches

Inches; had this been multiply'd and Divided as aforesaid, you had then produc'd the Content in solid Inches, as before in Gallons and Parts.

Or it may be done thus: First, Square the Diameter de , and multiply that Square into the Altitude of the lesser *Frustum* bc ; which will be 3456 reserve this. Then say, as the Altitude of the greater Segment ca , 24. to $\frac{1}{2}$ thereof added to $\frac{1}{6}$ of the lesser Altitude, that is, as 24 to 13; so is the former Summ reserved 3456 to a 4th Number 1872. Then say, as 14 to 11; so is the 4th Number 1872, to the Solidity of this *Frustum*, viz. solid Inches 1471 *fere*; which will be 5 Gallons, and almost $\frac{3}{4}$ of an Ale-Gallon, viz. $28\frac{1}{2}$. and 10 of others, you may proceed by the same Rule.



A SHORT
SYNOPSIS
OF THE
LAWS
OF
EXCISE.

*By several Acts of Parliament, the
Duties of Excise are as follows,
Viz.*

Beer or Ale above the Value of 6 s.
the Barrel, Brewed by any } l. s. d.
Common Brewer, Innkeeper, or } 0 04 9 2 Bar.
Retailer to pay by 12 Car. 2. and }
4, 5, and 6 Gwli. & Mar.

Beer or Ale of 6 s. the Barrel, or un- }
der, to pay, *ibid.* } 0 01 3 2 Bar.

Syder and Perry made and sold, to }
pay, *ibid.* } 0 10 3 a Hogsh

Vinegar

108 *The Practical Gauger.*

| | <i>l.</i> | <i>s.</i> | <i>d.</i> |
|--|-----------|-----------|------------|
| Vinegar-Beer to pay. By 12 Car. 2. and 4, 5, 6 Gul. & Mar. | 0 | 05 | 06 a Bar. |
| Vinegar made of any other English Materials, to pay by 2 and 4 Gul. & Mar. | 0 | 04 | 06 a Bar. |
| Vinegar made of or mixt with Foreign Materials, to pay, <i>ibid.</i> | 0 | 12 | 00 a Bar. |
| Metheglin, or Mead, to pay by 12 Car. 2. and 2 4 Gul. & Mar. | 0 | 00 | 10 a Gal. |
| Low-Wines Distilled from Foreign Materials to pay by 7 and 8 Gul. 3. | 0 | 00 | 08 a Gal. |
| Low-Wines Distilled from Brewers wash or Tilts, to pay, <i>ibid.</i> | 0 | 01 | 00 a Gal. |
| Low-Wines Distilled from Drink Brewed of Malted Corn, to pay, <i>ibid.</i> | 0 | 00 | 01 a Gal. |
| Low-Wines Distilled from any other English Materials, to pay, <i>ibid.</i> | 0 | 00 | 03 a Gal. |
| Spirits or Strongwaters of the Second Extraction, to pay, 12 Car. 2. | 0 | 00 | 02 a Gal. |
| Sweets, to pay, by 7, 8, and 9 Gul. 3. | 1 | 04 | 00 a Bar. |
| Malt, to pay, by 8 and 9 Gul. 3. | 0 | 00 | 06 a Bush. |

Of Liquors Imported.

| | | | |
|--|-----------|-----------|-----------|
| Beer, Ale, or Mum Imported, to pay, by 12 Car. 2. and 4, 5, 6, 8 and 9 Gul. 8cc. | <i>l.</i> | <i>s.</i> | <i>d.</i> |
| | 0 | 05 | 0 a Bar. |
| Syder Imported; to pay, by 12 Car. 2. and by 4, 5, and 6, Gul. & Mar. | 12 | 10 | 0 a Tun. |
| Spirits Imported from Guernesey, Jersey, &c. to pay, by 2, 7, 8 Gul. 3. &c. | 00 | 08 | 0 a Gal. |

Brandy,

The Practical Gauger. . 109

Brandy, or Strongwaters Imported, } l. s. d.
 to pay, by 12 Car. 2. and 4, 5, 6, } 00 03 8 a Gal.
Guli. & Mar.

Double Brandy, to pay, *ibid.* 00 06 4 a Gal.

Note, That Duties upon all Liquors Imported, are to be paid by the Merchant before Landing. By 12 Car. 2.

Of Barrels, &c.

Thirty six Gallons (according to the *Exchequer-Quart*.) shall be accounted a Barrel of Beer, and Thirty two a Barrel of Ale; within *London*, and the Weekly Bills of Mortality. But in all other parts of *England*. Thirty four Gallons, shall be accounted a Barrel of Beer or Ale; whether strong or small. By 1 *Guli. & Mar.*

All other Exciseable Liquors, to be Gauged and Charged according to the Wine-Gallon, kept in the *Guild-Hall London*. 12 Car. 2.

Of Allowances.

Common Brewers in *London*, &c. are to be allowed 3 Barrels in every 23 of Beer; and 2 Barrels in every 22 of Ale; out of the return made by the Gauger, by 12 Car. 2. and 1 *Guli. & Mar.*

Common Brewers in the Country are to be Allowed 2 Barrels and a half in every 23 Barrels of Beer or Ale. By 1 *Guli. & Mar.*

Common Brewers, Inn-keepers, Victuallers, &c. If charged in warm Worts, are to be Allowed one tenth Part thereof by the Gauger for wash and waste. By 1 *Guli. & Mar.*

of

110 *The Practical Gauger.*

Of Brewers, Victuallers, &c.

Common Brewers are to make true, and particular Entries once in every Week; at their next Office of Excise, or forfeit 15 Pounds for every Neglect. By 12 *Car.* 2.

If Common Brewers make false Entries willfully, and are Convicted of the same, they lose their Allowance for Six Months, *ibid.* unless they rectifie them according to the Gaugers Return, within one Week after. By 15 *Car.* 2. and 1 *Guli. & Mar.*

Inn-keepers; and Victuallers, &c. are to make true and particular Entries once in every Month, at their next Office of Excise; in case of neglect the Inn-keeper forfeits 10 *l.* and the Victualler 40 *s.* per Month. By 12 *Car.* 2.

Common Brewers not to deliver or carry out any Beer or Ale, from *March* the 25th to *Sept.* the 29th, but between 3 in the Morning and 9 at Night, and from *Sept.* the 29th to *March* the 25th, but between 5 of the Clock in the Morning and 7 at Night; the Penalty being 20 *s.* for every Barrel so carried out, &c. By 15 *Car.* 2. and 1 *Guli. & Mar.*

Common Brewers are to shew the Gauger (*bona fide*) all the Beer, Ale and Worts of every Guile, or they lose the Benefit of a *Provisi* in 15 *Car.* 2. for rectifying their Entries; or if any other Act be done to defraud His Majesty of the Duty. By 1 *Guli. & Mar.*

Common Brewer, or his Servant upon every Guile shall declare to the Gauger, how much
Strong

The Practical Gauger. III

Strong Beer or Ale, and how much Small he intends to make of such Guile; or to forfeit 20 s. for every Barrel of Beer or Ale contained in such Guile. By 8 and 9 *Guli.* 3.

Common Brewers shall not deliver any Wash, Tilts, Ale, Beer, or Vinegar-Beer, to any Distiller, or Vinegar-Maker; on pain to forfeit 20 s. for every Barrel. By 8 and 9 *Guli.* 3.

No Common Brewer, or Victualler, shall Cleanse, Carry out, Remove, or Convey out of his Brew-house, any part of his Guile before the whole be Brewed off, and be in his Backs or Tuns, &c. without first giving notice to the Gauger; on pain to forfeit 40 s. for every Barrel so Cleaned, Carried out, &c. By 7 and 8 *Guli.* 3.

If any Brewer, &c. shall Convert Small Drink into Strong, by Mixture, &c. after the Gauge is taken, and shall Sell or Carry out the same, or any part thereof, without giving Notice thereof; he shall forfeit 20 s. for every Barrel. By 15 *Car.* 2.

Or, If any Brewer, &c. shall Hide, Conceal, or Convey away Beer, Ale, or Worts from the view of the Gauger, he shall forfeit 20 s. a Barrel. By 15 *Car.* 2.

No Common Brewer, Victualler, &c. shall make use of any Molosses, Course Sugar, Honey, &c. in Brewing or Working any Beer or Ale; on pain to forfeit 100 l. By 1 *Gul.* & *Mar.*

112 *The Practical Gauger.*

No Common Brewer, Inn-keeper, Victual-
ler, &c. shall Erect, Set up, Alter or Enlarge a-
ny Tun, Fatt, Back, Cooler, or Copper, with-
out first giving Notice thereof at the next
Office of Excise; on pain to forfeit 50 *l.* for
every such Offence. By 15 *Car.* 2.

No Common Brewer shall Erect, or keep
any Private or Concealed, Tun, Back, or Cop-
per, &c. on pain to forfeit 200 *l.* By 8 and
9 *Guli.* 3.

Every Common Brewer having any Pipes
or Stop-Cocks, or any other private Convey-
ance out of one Brewing Vessel into another,
&c. or shall have any Hole in any Tun, Batch,
or Float, forfeits 100 *l.* By 8 and 9 *Guli.* 3.

The Gauger hath power, (upon just cause
of Suspicion) to search for any private Pipe,
&c. and to Break up Ground, Wall, Partiti-
on, or any other place, &c. Any Person op-
posing the same, forfeits 50 *l.* *ibid.*

Gaugers may stay in the Brew-House, to see
the several Worts Brewed off, &c. In case
of refusal, the Brewer or Victualler, &c. for-
feits 20 *l.* by 7 and 8 *Gul.* 3.

Of Distillers and Distilling, &c.

Distillers of Low-Wines, removing them
after an Account taken thereof by the Gauger,
without distilling them off a second Time;
shall forfeit 5 *s.* for every Gallon so removed.
By 1 *Gul.* & *Mar.*

Distil.

The Practical Gauger. 113

Distillers that shall Hide or Conceal Low-Wines, or Spirits, &c. from the sight or View of the Gauger, shall forfeit 5 s. for every Gallon so concealed. By 3 and 4 of *Guli. & Mar.*

Distillers shall not prepare any wash made from Molosses, or other Materials, nor receive any Wash of Molosses, &c. from any other Person whatsoever, until they have Distilled off their other Liquors made or prepared from Malted Corn; on pain to forfeit 5 l. for every Barrel of such Liquors made of Corn, that are found undistilled into Low-Wines, &c. By 7 and 8 *Guli.* 3.

Distillers shall not set up, make use of, or alter any Tun, Cask, Wash-batch, &c. Nor keep, or make use of any private Ware-house, for laying of any Wash, Low-Wines, Spirits, &c. on pain to forfeit 20 l. for every such Tun, Cask, &c. By 3 and 4 *Guli. & Mar.*

And the Person or Persons in whose Occupation any House or Place shall be, wherein any such Concealed, Tun, Cask, &c. shall be found, shall also forfeit 50 l. By 8 and 9 *Guli.* 3.

Any Person that shall make or keep any Materials fit for Distillation, having in his Possession any Still containing 20 Gallons, shall be deemed a common Distiller for Sale. By 8 and 9 *Guil.* 3.

No Distiller shall set his Stills to Work, or carry out any Low-Wines, Spirits, &c. between the 29th of Sept. and the 25th of March.

114 *The Practical Gauger.*

March, after 8 a Clock in the Evening or before 5 in the Morning, and between the 25th of *March* and the 29th of *Sept.* after 9 in the Evening or before 3 in the Morning; upon pain to forfeit 10 *l.* for every such Offence. By the 7 and 8 *Guli.* 3.

The Gauger may take an account of all Materials prepared for Distillation, &c. And in case he shall miss any Wash or other Materials, &c. which he Gauged within 24 hours before, he may charge the Distiller with so much Low-Wines, as such Wash so missing would reasonably have made. By 7 and 8 *Guli.* 3.

The Gauger may take off the Head of any Still that is not at work, to examine what Materials are therein, and in case the Still be at Work, he may stay in the Still-House untill it be off, &c. In case of Refusal the Distiller forfeits 20 *l.* By 7 and 8 *Guli.* 3.

Any Gauger that shall wittingly Charge Low-Wines not distilled from Corn, as such, shall forfeit his Employment, and 10 *s.* for every Gallon of Low-Wines so charged. By 7 and 8 *Guli.* 3.

Of Sweets and Syder, &c.

No Maker of Sweets, shall Erect, Set up, or make use of any Steeping-Tub, Tun, Cask, or other Vessel, for the making or keeping of Sweets, without first giving Notice thereof at the next Office of Excise; upon pain to forfeit

The Practicall Gauger. 115

feit 50 *l.* for every such Steeping-Tub, &c.
By the 8 and 9 *Guli.* 3.

If any Maker of Sweets for Sale, shall hide Conceal or Convey away any Sweets from the sight or View of the Gauger; he shall forfeit 40 *s.* for every Barrel of Sweets so hid, &c. and so, in proportion for any greater or lesser Quantity. By 7 and 8 *Guli.* 3.

Any Maker of Sweets refusing the Gauger Enterance, &c. or to Gauge and to take an account thereof, shall forfeit 15 *l.* *ibid.*

If any Maker of Sweets, &c. shall Sell, Deliver, or Carry out any Sweets, in whole Casks, or by the Gallon, (without first giving notice thereof to the Gauger) between the 29th of *Sept.* and the 25th of *March*, after 8 a Clock in the Evening, before 5 in the Morning, or between the 25th of *March*, and the 29th of *Sept.* after 9 in the Evening, before 3 in the Morning; upon Pain to forfeit 40 *s.* for every Barrel of Sweets so carry'd out. By 7 and 8 *Guli.* 3.

If any Maker and Retailer of Syder, &c. shall Hide, Conceal, &c. he shall forfeit 40 *s.* for every Hogshead of Syder so Hid, &c. by 7 and 8 *Guli.* 3.

If any Maker of Syder for Sale, shall Refuse the Gauger Entrance, &c. he shall forfeit 15 *l.* for every such default. *Ibid.*

Any Person who shall Buy any Syder or Perry, or any Fruit to make into Syder, &c. and shall sell any part of the Syder, &c. so bought or made; shall be deemed and taken

116 *The Practical Gauger.*

to be a Retailer of Syder, &c. and shall be Chargeable with the Duties thereof, by the Malt-Act. 8 and 9 *Guli.* 3.

Of Vinegar, &c.

If any Maker of Vinegar, shall Refuse the *Gauger* Entrance, &c. or to Gauge and take an account of his Vinegar, &c. he shall forfeit, and lose the summ of 15 *l.* by 7 and 8 *Guli.* 3.

If any Maker of Vinegar, shall Sell, Deliver, or Carry out any Vinegar, at the Prohibited Times before mention'd for Sweets, &c. he shall forfeit 40 *s.* for every Barrel of Vinegar, &c. so carry'd out, by 7 and 8 *Guli.* 3.

If any Maker of Vinegar shall Hide, or Conceal, &c. any Vinegar or Liquors prepar'd for Vinegar, he shall forfeit 40 *s.* for every Barrel of Vinegar, or Liquors, &c. By 7 and 8 *Guli.* 3.

Of Malt, &c.

By an Act of Parliament made in the 8 and 9 *Guli.* 3. call'd the *Malt-Act.*

The *Gauger* hath power to Enter into all Places belonging to any Malster or Maker of Malt for Sale (or not for Sale) to Gauge all Cisterns, Utting-Fats, &c. used by any such Maker of Malt. Any Malster refusing the same, forfeits 5 *l.* for every Offence.

Malsters or Persons Making Malt; shall make a true Entry every Month at the next Office of Excise, of all Malt by them made in that Month, upon pain to forfeit 10 *l.*

Malsters

The Practical Gauger. 117

Malsters to pay and clear off all their Duties within Three Months after they made or ought to have made their Entry; upon pain to forfeit double the said Duties.

No Malster after Default of Payment as aforesaid, shall Sell or Deliver any Malt, until he hath paid and cleared off his Duty; upon pain to forfeit double the Value of such Malt.

If any Malster shall Erect, Set up, Alter or Inlarge, or make use of any Cistern, &c. for wetting any Barley for making of Malt, or shall keep, or make use of any private Cistern, &c. he shall forfeit 50*l.* for every such Offence.

All Offences against any of the Acts of Excise, that are committed within the immediate Limits of the Chief Office of Excise in London, shall be heard and adjudged by the Chief Commissioners. By 12 Car. 2.

All Offences, &c. committed in any other Part or Place in England, are to be heard and adjudged by Two or more Justices of the Peace, residing near to the Place. And in case of their neglect for the space of Fourteen Days, Then by the Sub-Commissioners of the County or Place where the Offence was committed. *ibid.*

All Appeals from the Judgment of the Chief Commissioners of Excise, to be Heard and finally Determined, by the Commissioners of Appeals. By 12. Car. 2.

All

118 *The Practical Ganger.*

All Appeals from the Judgment of the Justices, or Sub-Commissioners, to be Heard and finally Determined, by the Justices of the Peace at their next Quarter-Sessions.

12. Car. 2.

Any Appeal within the Limits of the Chief Office in *London*, must be brought within two Months next after the first Judgment; and in all other places within the four Months after the first Judgment, &c. 15 Car. 2.

If upon any Appeal the Original Judgment be Reversed, the Appallant shall have double Costs: But if the Original Judgment be affirmed, then the Appellant shall pay double Costs. By 15 Car. 2.

FINIS.

BOOKS Printed for
*J. Phillips, H. Rodes, and
J. Taylor.*

THE *New World of Words: Or, An Universal English Dictionary*, Containing the proper Significations of all Words from other Languages. The 5th Edition with Large Additions and Improvements, from the best *English* and Foreign Authors.

The Grounds and Occasions of the Contempt of the Clergy and Religion enquired into, in a Letter to R. L. with Observations on the Answer thereto, in a Letter to the same. To which are added Considerations on Mr. *Hobbs's* State of Nature; with several other Pieces. By *John Eachard* D. D. late Master of *Katharine-Hall*, and Vice Chancellor of *Cambridg*.

Culpepper's School of Physick, or the Experimental Practice of the whole Art.

The Queen's Closet Opened, being incomparable Secrets, in Physick, Preserving, Candyng and Cookery, &c. which were presented to the Queen, by the most Experienced Persons of the Times. The Tenth Edition with Large Additions.

The

A Catalogue of Books.

The Compleat *Midwife's* Practice, enlarged in the most weighty and high Concernments of the Birth of Man: Containing, A Perfect Directory or Rules for *Midwives* and *Nurses*; As also, A Guide for Women in their Conception, Bearing and Nursing of Children. The Fifth Edition Corrected and much Enlarged. By *John Pechey*, Fellow of the College of Physicians London: The whole Illustrated with Copper-Plates.

Æsop's Fables with their *Morals* in Prose and Verse, Grammatically Translated, Illustrated with Pictures and Emblems, with the History of his Life and Death. Exactly Translated out of the Original Greek.

Mr. Wingate's *Arithmetick*; Containing a Plain and Familiar Method for attaining the Knowledge and Practice of Common *Arithmetick*. The Tenth Edition much Enlarged. First Composed by *Edmund Wingate*, late of *Gray's-Inn*, Esq; afterwards upon Mr. Wingate's Request enlarged in his Life-time; also since his Death carefully Revised and much enlarged: By *John Kersey*, late Teacher of the *Mathematics*.

John Wingate's Arithmetick 1728

Book 1728

Arithmetick

1728

816

1728

1728

1728

1728

1728

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

F203800

To Cole 10/22

171-L